TECHNOLOGY DEPT.

FLIGHT MAGAZINE

DECEMBER 1956

50 cents

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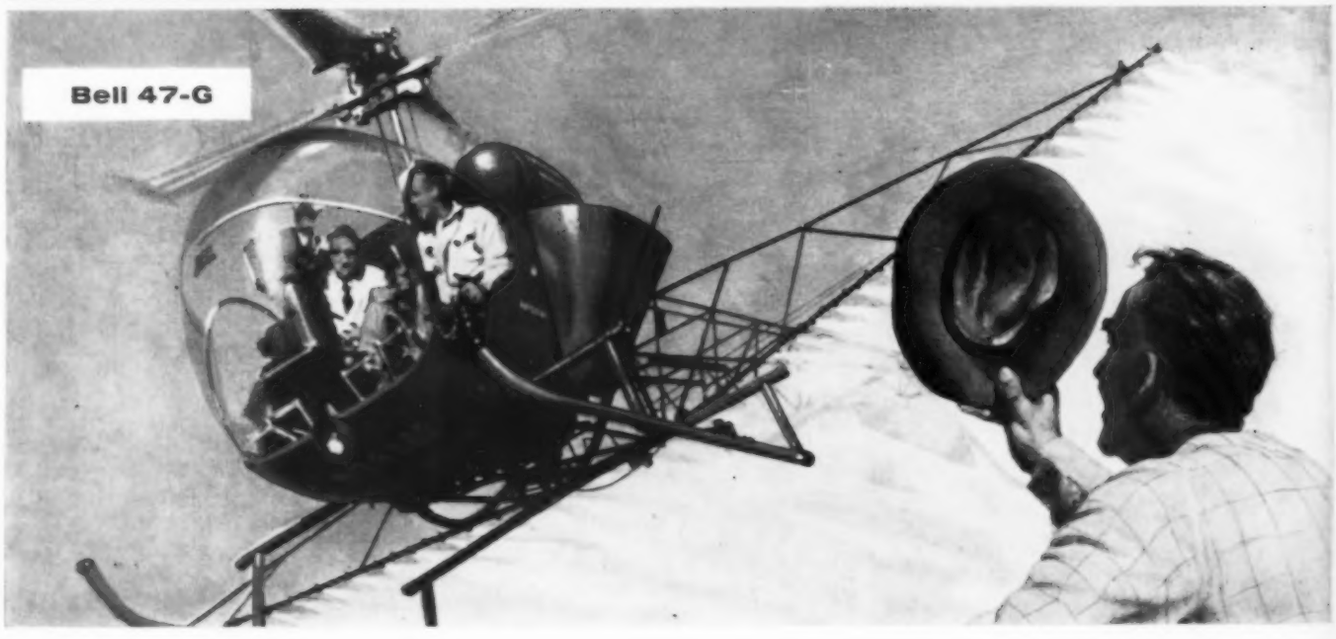
Vol 45 #12

VERTOL H-21

(See Annual Helicopter Section)



Birds of a feather with one thing in common . . . the dependable flow of power through SPECO Transmissions . . . engineered and built by the SPECO Aviation Division of the Kelsey-Hayes Company, Detroit 32, Michigan.

KELSEY HAYES

Major Supplier to the Automotive, Aviation and Agricultural Industries

15 PLANTS ***Automotive:*** *Detroit and Jackson, Michigan; McKeesport, Pa.; Los Angeles, Calif.; Windsor, Ontario, Canada* ***Aviation:*** *Jackson, Michigan; Springfield, Ohio — 2 plants — (SPECO Aviation Division); Utica, New York — 4 plants — (Utica Drop Forge and Tool Division)* • ***Agricultural:*** *Davenport, Iowa (French & Hecht Farm Implement and Wheel Division)*

New Cessna YH-41 "delivers" top performance plus big maintenance savings to helicopter flying!

Cessna's all-new YH-41, recently purchased by the U. S. Army for its air "arm", combines the latest in design and engineering advances to give **operating** and **maintenance** performance never before experienced in the helicopter field!

For example, the engine — mounted in the nose of the fuselage — makes installation and servicing easy — provides extra cargo, or passenger space. Cessna has made the rotor assembly aero-dynamically clean. Also, the drive system on the new YH-41 is a masterpiece of simplicity, has a minimum of parts — conveniently located for easy servicing.

Cessna

Offering multi-utility uses, the 4-place, YH-41 at 3,000 lbs. gross weight — can climb higher, faster than any other helicopter in its class — sea level to 10,000 ft. in less than 12 minutes! Its speed is the fastest in the light helicopter field.

From Cessna . . . a new concept in helicopters

CESSNA AIRCRAFT COMPANY, Wichita, Kansas

One in a series about users of Phillips 66 Aviation Products

Phillips 66 LOOKS AHEAD with TWA

New York to Los Angeles in 4¼ hours! That is the anticipated schedule for the new 707 Jet Stratoliners ordered by TWA for mid-1959 delivery. Shown below, the new plane will have a cruising speed of 575 miles per hour, and a range of 3500 miles.

Interior scenes shown below are from a mock up of the Boeing 707

ALL ABOARD *for new passenger comfort made even more pleasurable by gaily-colored interior paneling. Conditioned air system, hat racks, lavatories, all are designed for maximum convenience.*

NINETY-EIGHT PASSENGERS *can be seated in present mock up design. Lounge seats can be removed for 10 more passenger seats. Smoke tint plastic window shades can be pulled up for glare reduction.*

RELAXATION DE LUXE *in the modern new forward lounge. Wall panels, snap fastened, can be removed for maintenance and replacement in a short time and with a minimum of effort.*

● Today, Phillips 66 Aviation Gasoline gives dependable, efficient performance to TWA and other leading air lines, as well as to the military air services.

In step with the future, Phillips is a leading producer of *super performance* Jet Fuels for the latest designs in turbo-props and jets. And Phillips research continues to lead the way for development of fuels for the aircraft of tomorrow.

AVIATION DIVISION • PHILLIPS PETROLEUM COMPANY • BARTLESVILLE, OKLAHOMA

AIR Report

Significant Trends and News

FIRST TURBINE POWERED COMMERCIAL HELICOPTER probably will be a converted Sikorsky S-58, which is now powered by a 1,525-hp. Wright R-1820, grosses 12,700 lbs. with a 5,140-lb. useful load, seats 12 to 14 and costs $248,000. Sikorsky factory is modifying an S-58 by replacing the Wright with two General Electric T-58 turbines rated at about 1,000 hp. each for flight testing. Success is expected, with the turbines making possible engine-out dependability, more speed and about 25% more payload. When T-58 becomes available in quantity, it will be installed in all future S-58's, both military and commercial, and commercial operators of existing S-58's will be able to modify their machines with turbine installations. No estimate as to commercial turbine prices is available, but T-58 is expected to cost considerably more than the $30,000 Wright 1820 even from quantity production. Vertol and Bell also have turbine projects under way. For the fifth straight year, FLIGHT MAGAZINE features a special helicopter section in this issue, with the emphasis on commercial machines and operations.

FIVE MANUFACTURERS CURRENTLY OFFER 9 DIFFERENT COMMERCIAL HELICOPTERS on the market — Bell with 4 versions of its Model 47, Doman with its LZ-5, Hiller with its 12C, Sikorsky with its S-55 and S-58 and Vertol with its Model 43 tandem-rotor. Prices range upward from $41,500 for the 3-pl., 200-hp. Bell 47G and include $63,750 for the 4-place Bell 47J, $120.000 for the 8-place Doman LZ-5, $147,500 for the 10-place Sikorsky S-55, $248,000 for the 12-14-place Sikorsky S-58 and $275,000 for the 18-21-place Vertol Model 43. All are single-engine aircraft. The 2-to-4-place Cessna CH-1 has been certificated but commercial versions will not be offered until after military production reaches quantity proportions. It will be priced competitively with Bell's $63,750 4-place 47J.

MORE THAN 900 COLLINS AIRBORNE ANTI-COLLISION PROXIMITY INDICATOR SYSTEMS VALUED AT $10,000,000 have been ordered by airlines and executive aircraft operators, even before its development has been completed.

FIRST NAVY CONTRACT TO A NON-MANUFACTURING FACILITY FOR JET ENGINE OVERHAUL has been issued to Southwest Airmotive of Dallas and calls for reworking 300 J33-A-16 engines at a total cost of $750,000. The firm is already overhauling Air Force jets.

AIR FORCE-ENDORSED CIVIL AIR PATROL FLIGHT TRAINING PROGRAM FOR 2,000 CAP CADETS ANNUALLY was announced last month by Maj. Gen. Walter R. Agee, CAP commander, at the National Aviation Trades Association meeting in St. Louis. Fixed-base operators will provide the instruction, which will include 35 to 42 hours of flying time comprising a private-pilot cross-country course. Legislation will be introduced at the next session of Congress to obtain funds for the big project, which will be inaugurated on a limited scale the first year in Texas, Louisiana, Mississippi, Arkansas, Oklahoma, New Mexico and Arizona and on a nationwide scale of 2,000 cadets annually the second year, including Hawaii, Puerto Rico and Alaska. Later, a level of 10,000 flight scholarships annually will be the goal.

PACIFIC AIRMOTIVE HAS ACQUIRED OWNERSHIP OF LEARCRAFT CONVERSIONS and is now operating as "PacAero Corp." the Santa Monica facilities made famous by the Learstar, continuing all of the aircraft modification and installation services which the Lear operation offered. Vernon Benfer, general man-

FLIGHT MAGAZINE

DECEMBER, 1956 VOL. 45, No. 12

THIS MONTH'S COVER: *Featuring helicopter progress for our fifth straight year, this issue has on its cover a portrait of the Vertol H-21 tandem-rotor transport. Powered by a 1,425-hp. piston engine, the 18-21-place workhorse of the air is being certificated as the Vertol 43 for commercial sales at $275,000.*
—(Vertol Photo.)

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GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; FRED N. STONES, JR., Business Manager; LOUISE ROBERTSON, Circulation; E. H. PICKERING, *Consultant;* P. O. BOX 750 (2700 N. Haskell Ave.), Dallas, Texas—Telephone TAylor 3-6191.

FLIGHT MAGAZINE, December, 1956, Vol. 45, No. 12. Published Monthly. Publication office, P. O. Box 750 (2700 N. Haskell Ave.), Dallas, Texas. Price 50c single copy. Subscription rates: United States, one year, $3.00; two years, $5.00; three years, $6.00. Established February, 1934. Entered as second-class matter at the Post Office, Dallas, under the act of March 3, 1879.

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DARE announces its new...

360 Channel VHF Transceiver

with 15-watt Transmitter Output

A new DARE Communications transceiver, born of consumer demand, and developed to maximum usability by DARE engineers is now ready. The new DTR-360 features great compactness, with maximum power and sensitivity. Moderately priced, it is ideal for executive, corporate, military or transport requirements. The entire unit, including dynamotor is built on a ½ ATR frame, mounted for maximum protection on latest type metal-mounts.

Brief Specifications

Receiver Sensitivity—2 microvolts or better for 150 milliwatt output. Highly selective circuit employs double conversion. Audio output up to 8 watts for loud and clear speaker reception or headphone use. Adjustable squelch.

Transmitter—Power Output at least 15-watts on any channel. Frequency stability .01% or better. Eight ruggedized tubes.

Power Supply—Dependable dynamotor type. Two voltage regulator tubes provide drift free operation of all critical circuits. 14 or 28 volt input, as desired. Also includes transmitter modulator and receiver power output stages.

Physical—(with shock mount) Overall size 9¾" high x 23¾" long x 5" wide. Net weight 24 lbs. complete.

180 or 360 Channel Operation—Available for either 180 or 360 channels. On 180 operation you get a crystal controlled channel every 100 kilocycles all the way from 118.0 megacycles to 135.9 megacycles. On 360 channel operation you have a crystal channel every 50 kilocycles over the same range.

Simplex or Cross Channel (Duplex) Operation—With a single DARE backlighted control you receive and transmit on the same selected channel. With two DARE controls you can receive and transmit on different channels, if you so desire.

Economical Crystal Saver Circuit—DARE engineering has devised a unique circuit requiring only ten frequency wires to connect the control to the transceiver. Only 38 crystals are required for 180-channel operation and only 58 for 360 channel.

Easy on the serviceman, too—The new DTR-360 was designed for economical servicing. The entire unit is "unitized," has separate chassis for receiver, transmitter, and power supply elements. All tube testing and service alignment can be done from one side, which is easily accessible. Front panel jacks make transmitter metering easy.

DARE MICRO-TUNER SYSTEM

The Completely Flexible VHF System For Communications—Navigation—or Both

Modular construction includes 22-channel 3-4 watt transmitter, precise tunable receiver, dynamotor power supply, omni-ILS indicator and omni converter. Direct or remote control units. All equipment is shockmounted, resulting in better performance and easier servicing. Ideal for helicopters, business planes and private aircraft. Write for details.

Available from 55 leading aircraft distributors

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TROY, OHIO

ager of the facility for Lear, has been retained and is president of PacAero, according to John W. Myers, PAC president. A total of 20 Learstars have been delivered and are in operation.

AERO COMMANDER PRODUCTION AND DELIVERY OF 134 TWIN-ENGINE BUSINESS PLANES during the first 10 months of 1956 is one of the aircraft industry's outstanding aircraft factory efficiency records in view of the small size of the Aero Commander factory at Oklahoma City. The firm's stockholders last month elected to its board of directors CARL WOOTTEN, sales manager; TEX NEWMAN, personnel director; A. R. BELL, JR., consultant and R. J. WHITE, assistant to the chairman. Their election was announced by Rufe Amis, president. . . .

LATEST AERO COMMANDER DELIVERIES included one to Convair at Ft. Worth for its flight test department's use as a business transport. Convair has begun flight-testing the supersonic B-58 Hustler bomber and will use the Commander for shuttling its pilots and crews. This delivery was made by Brown Aero of Dallas, distributors.

AERO CORP. OF ATLANTA'S BUSINESS FLYING CENTER will overhaul an Argentine Navy C-54, replacing engines and propellers, converting the fuel system and installing radar and autopilot. Aero is already converting 12 F4U-5 Corsairs for the Argentine Navy. Recent X-ray inspections of DC-3's performed by Aero Corp. of Atlanta included planes of Magnavox and Barwick Mills.

HAYDEN AIRCRAFT'S REVISED

NEW ENGINE TEMPERATURE INDICATOR developed by the AC Spark Plug Division of General Motors for the new Beechcraft Travel Air small twin. Twyla Webb of AC displays the unit, which replaces a larger and more expensive thermocouple. The capsule, mounted in an engine cylinder, has a built-in "negative co-efficient" resistor — resistance is lowered as temperature rises, the change causing the pointer on the dash to move for accurate indications up to 600 degrees.

BELL MODEL 47G

OIL MAN *in a hurry*

HELICOPTER OR BOAT . . .
FIFTEEN MINUTES OR TWO HOURS?

Magnolia Petroleum Company answers its own offshore transportation problem with a Bell Model 47G helicopter. Magnolia considers this versatile aircraft an indispensable time saver...ferrying executives and supervisory personnel, keeping its costly offshore operation moving, saving 105 minutes from the time it formerly took to make the trip by boat . . . and it's a morale builder, too. Workers know it's only a matter of minutes by helicopter from rig to shore in an emergency.

With float landing gear, the Bell helicopter lands anywhere, in any climate, in severe weather. Lowest in initial cost and maintenance the Bell helicopter is backed by more than two million hours of flight experience throughout the world.

For the complete story of Bell economy and reliability, write, wire or phone:

Outstanding job opportunities for qualified engineers.

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Is your Jet Engine RPM Measurement Accurate???

The NEW B&H Instrument

TAKCAL

• COMPACT
• LIGHT
• RUGGED

• • • Reads Jet Engine Speed to Guaranteed Accuracy of 10 RPM in 10,000 RPM (±0.1%)

Checks Tachometer System

Adapts to any Frequency Problem

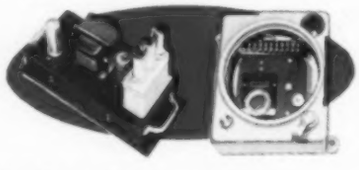
The inter-relation of RPM to efficiency and thrust in jet engines is fundamental. Proper adjustments for maximum thrust, engine life and safety of operation can be made only upon accuracy of instrumentation.

The new B&H TAKCAL incorporates a refinement of the frequency meter principle. It operates in the low (0 to 1000 cps) range, reading the frequency of the tachometer generator on a scale calibrated in percent RPM corresponding to the engine's RPM. In addition, the TAKCAL checks the tach system. The TAKCAL circuit and tachometer are parallel so that readings can be made simultaneously to determine the accuracy (or inaccuracy) of the aircraft's tach system. The TAKCAL operates during the engine run to properly set up engine controls for maximum economy and safety.

The TAKCAL's component parts are identical with those used in the J-Model JETCAL Analyzer. They are here assembled as a separate unit tester and for use with all earlier models of the JETCAL Tester.

The TAKCAL operates accurately in all ambient temperatures from −40°F. to 140°F. Low in cost for an instrument of such extreme accuracy, it is adaptable to application in many other fields.

Explosion-proof TAKCAL for special applications. Measures 200 to 7500 RPM, direct reading, with ±0.1% accuracy.



For full information write or wire

TAKCAL

West Coast Office | 427 E. Grand Ave. El Segundo, Cal.

B & H INSTRUMENT CO., INC.
3479 West Vickery Blvd., Fort Worth 7, Texas

NEW TEMCO ROCKET TARGET FOR NAVY, the low-cost, expendable XKDT-1, will operate at sonic speeds at altitudes above 50,000 ft. and has self-guidance system and ability to register on radar scopes as a fighter-size craft. It is launched from carrier-based aircraft and will be extensively tested. Temco Aircraft developed it at its Dallas plant.

BUSHMASTER VERSION OF THE FORD TRI-MOTOR will go into production next year at Bellflower, California, and will be certificated in the personal aircraft category. It will have twice the power of the old Ford with three 450-hp. R-985's, fuselage will be 18 inches wider at 6 ft., passenger capacity will be upped from 14 to 21, its fixed gear will have hydraulic struts, Jeep-size cargo door will be installed and floor loads will be increased. Gross weight will be less than 12,500 lbs., with empty weight less than 7,000 lbs. and useful load more than 5,000 lbs. Fully loaded, it will get off in 600 ft., clear a 50-ft. obstacle in 1,000 ft. and will land within 600 ft. from touchdown. Later it will have flaps installed. Top speed will be 150 mph., cruise 125, stall 55. Service ceiling will be 20,000 ft. Price goal: $125,000 or less. Between 1926 and 1932, 196 Ford Tri-Motors were built. Over 30 are still flying, mostly in Latin America but including several on skis in the Arctic, two as spray planes in Montana-Idaho, six carrying U. S. Forestry Service parachute fire fighters and one in Stalingrad, Russia.

FIFTEENTH ANNUAL MIAMI-HAVANA AIR CRUISE will be held January 8-11 and its sponsor, the Florida Air Pilots Association, invites business plane owners everywhere to

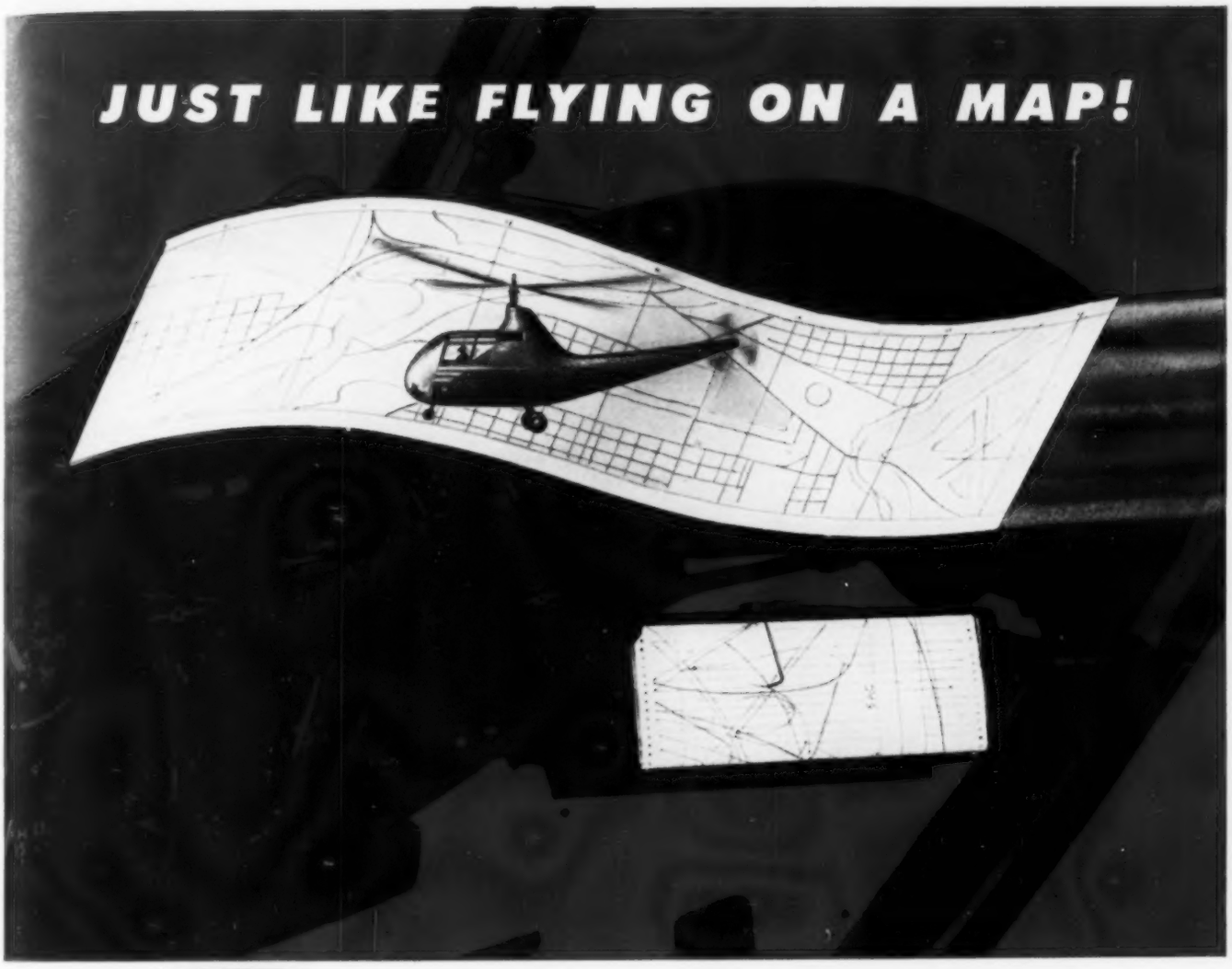
Airmen's Calendar

Dec. 17—Annual Wright Day Dinner, Sheraton Park Hotel, Washington, D. C.

Jan. 8-10—15th Annual Miami-Havana Air Cruise, Sponsored by Florida Air Pilots Association; James G. Pace, Cruise Director; Headquarters, Tamiami Airport, 11700 S. W. 8th St., Miami.

Jan. 21-23—Helicopter Association of America Annual Convention, Sheraton-McAlpin Hotel, New York City.

June 1-9—First Annual National Aviation Trades Show and Exhibits, Monmouth County Airport, New Jersey.



That's Bendix-DECCA

... the 3-way Navigation System for Helicopters

Bendix Decca actually traces on a map in the helicopter cockpit the exact route you are flying. Every movement of the craft is instantly traced on this Flight Log. You **always** can see exactly where you are — in any weather — and you can fly a safe, positive course.

Bendix Decca gives you a 3-way check — (1) for accurate area coverage navigation, (2) for traffic control and (3) as a safe approach and landing system.

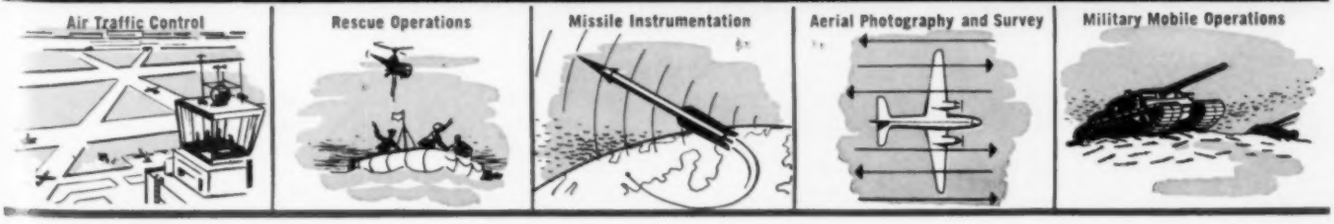
This is the **low frequency system** which operates behind buildings, beyond line of sight and below the curvature of the earth.

Decca is the missing link in helicopter navigation.
Write us for the complete story.

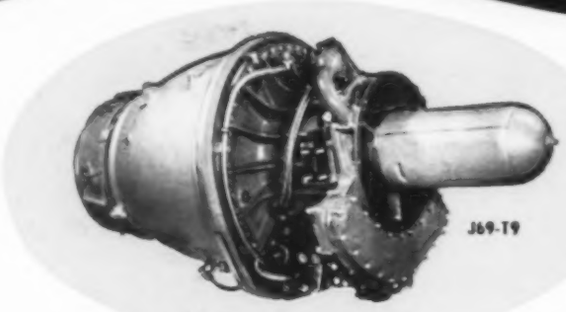
DECCA NAVIGATOR SYSTEM

Bendix
PACIFIC DIVISION
Bendix Aviation Corporation
NORTH HOLLYWOOD, CALIF.

BENDIX-DECCA SOLVES THE PROBLEMS OF...



TEMCO TT-1



LATEST DEFENSE ASSIGNMENT for CAE TURBINE POWER

Performance and ease of control join hands with a high degree of safety in Temco's TT-1 primary jet trainer, which the Navy has ordered into production after exhaustive tests. This modern tandem two-seater is designed to condition the student's reflexes to the piloting of jets, from the very start. It is a matter of pride and gratification to CAE that this newest addition to our country's military training equipment flies with Continental J69-T-9 gas turbine power.

CONTINENTAL AVIATION & ENGINEERING CORPORATION
12700 KERCHEVAL AVENUE, DETROIT 15, MICHIGAN

SUBSIDIARY OF CONTINENTAL MOTORS CORPORATION

take part. James G. Pace, 59 SE 8th St., Miami, is cruise director. Parties, Cuban tours and hotel arrangements are offered in a package plan costing $50 to $64 per person.

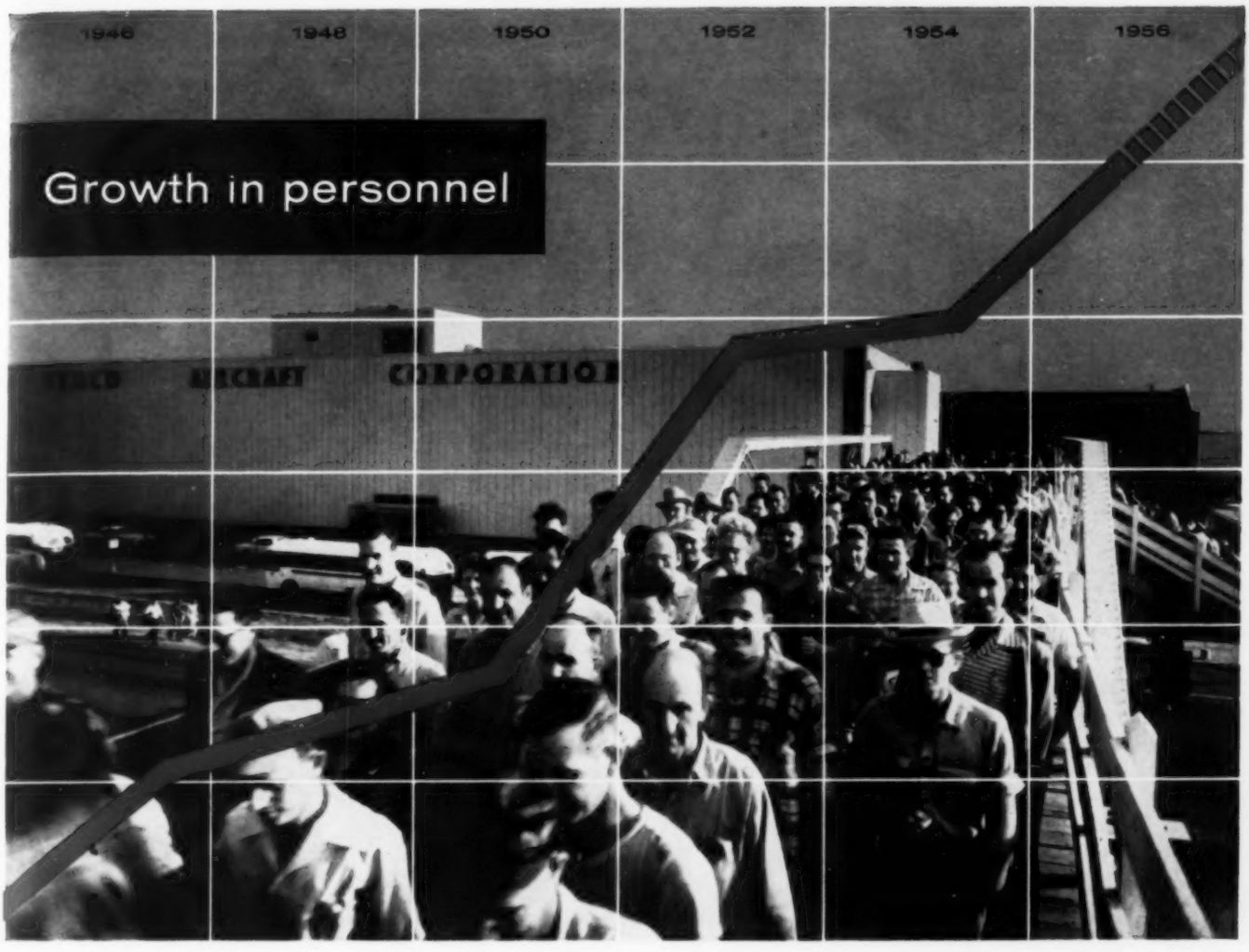
LOPEZ-GRACE AVIATION, FLORIDA BEECHCRAFT DISTRIBUTORSHIP, has moved its facility from Miami International Airport to Broward International Airport at Fort Lauderdale on the southwest ramp. Tom Grace says his mechanics specialize in servicing DC-4, C-46, DC-3, Lodestar, Beech and other aircraft. . . . **ATLANTIC AVIATION SERVICE, BEECHCRAFT AND PIPER DISTRIBUTORSHIP** with offices in Philadelphia, Wilmington, Teterboro, Boston and Lynchburg, has named Robert B. Ward as sales promotion manager.

PIPER AIRCRAFT SAYS IT WILL GREATLY EXPAND ITS RESEARCH AND DEVELOPMENT PROGRAM IN 1957. Howard Piper is vice president in charge of research and development.

DALLAS IS GETTING A NEW $2,000,000 EXECUTIVE AIRPORT located 6 miles north of Love Field on a 400-acre tract on Belt Line Road halfway between Carrollton and Richardson. A 4,500-ft. runway will accommodate business planes including Convairs. Known as "Addison Airport," the privately-owned business flying center will have a terminal omni (TVOR), lights for 24-hr. operation, restaurant, offices, sales rooms, six hangars for operators and 150 T-hangars. Henry Stuart, former operator of Park Cities Aero Service, has been engaged as manager. Opening is scheduled for next April.

OFFICERS OF NATIONAL AVIA-

NOT A FORMATION OF PRE-WAR CULVER CADETS, this picture is offered as a take-off portrait of a single (one airplane) Culver by Wally Schanz, the sage of Howey in the Hills, Florida. Wally says he filmed the Culver recently at Clearwater, Florida, during a spot landing contest on a breakfast flight of the Florida Aero Club, which has 9 chapters, is growing fast and is rekindling the old fires of flying for fun. Schanz is director of the Orlando chapter.



At TEMCO growth tells the story!

Growth — in personnel, for example, tells the Temco success story.

In 1945, Temco had 259 employees. Today, Temco has over 10,000 employees — at three integrated Texas plants — at work on contracts covering fourteen of the country's key military aircraft. Constant expansion in every department has equipped Temco to meet the increasing needs of the aircraft industry—to push ahead the company's own developments in electronics and in aircraft and weapon systems.

Temco's sturdy growth — in skills, facilities and experience — opens up outstanding opportunities for a complete range of engineering talents. If you are looking for a rewarding career in aviation, you will find it at Temco.

ENGINEERS

Openings in all phases of aircraft design and development. Write to Joe Russell, Engineering Personnel, Room 10-A, Temco Aircraft Corporation, Dallas, Texas.

TEMCO
AIRCRAFT CORPORATION, DALLAS

IN ENGINEERING THE BEST OPPORTUNITIES ARE IN AVIATION • IN AVIATION THE BEST OPPORTUNITIES ARE AT TEMCO

Announcing . . . the New

narco OMNIGATOR MARK II

More channels, increased transmitting power, tripled band width, whistle-stop tuning, increased speaker output—all these up-to-date features plus many others are offered in the sensational new Omnigator Mark II. Printed circuits plus the most advanced electronic refinements make all this added performance possible in the same compact single-package navigation and communications unit which has made the Omnigator the most popular, the most respected, the most accurate (proved by government test) of all popular business-plane Omnis.

NOW *with 27 Channels*

NO OTHER RADIO GIVES YOU SO MUCH IN A SINGLE, COMPACT UNIT

27 CHANNELS give you ample crystal capacity for all normal communications — VFR or IFR.

TRANSMITTER POWER INCREASED; BAND WIDTH TRIPLED.

DOUBLED AUDIO OUTPUT.

SUPER ACCURATE VOR navigation. Factory-certified to be accurate within 2 degrees.

LARGE SCALE COURSE SELECTOR permits accurate course selection to the exact degree.

IMPROVED COURSE INDICATOR with ideal sensitivity, combined with new type To-From indicator.

ILS LOCALIZER reception for instrument approaches.

75 Mc MARKER BEACON RECEIVER.

VHF RECEIVER 108 to 127 mc for crystal clear reception.

Plus

BUILT-IN WHISTLE-STOP TUNING!

Pioneered by Narco four years ago, tunes your receiver precisely, positively to your transmitter frequency for simplex communications with towers, control centers, Unicom.

See your Narco dealer or write for new brochure.

narco

NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

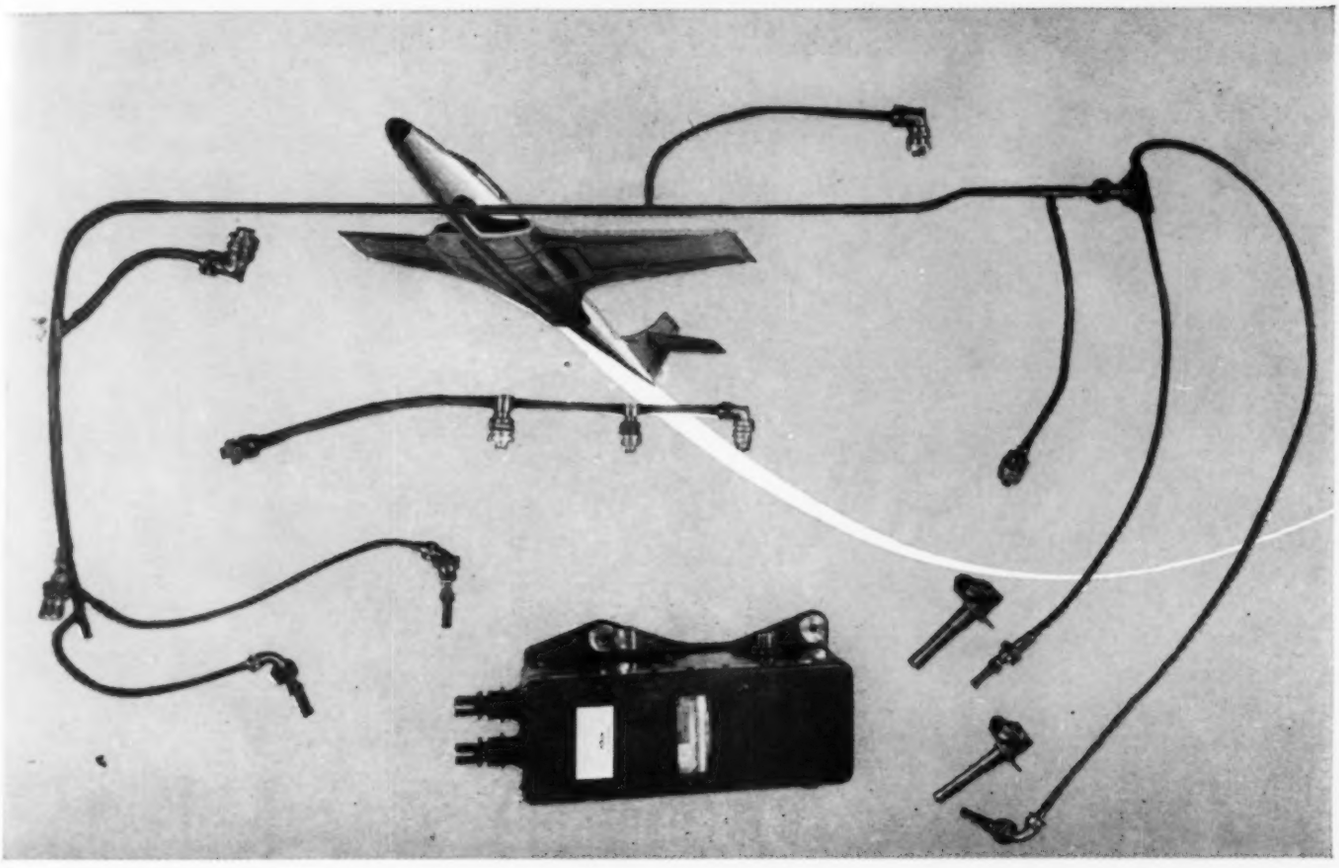
TION TRADES ASSOCIATION elected at its annual meeting last month in St. Louis are: President Galen Bertram, Southwest Kansas Aircraft Sales, Greensburg, Kansas; Eastern vice president, Richard N. Washburn, Southern Flight Service, Charlotte, N. C.; Western vice president, Larry Hunt, Air Oasis, Long Beach; treasurer, J. David Finger, Westchester Airport, Inc., Armonk, N. Y.; industrial vice presidents — airports, Ed B. Oliver, Daytona Beach; sales and service, E. V. Brugh, Jr., Greensboro; repairs and maintenance, John Griffin, Lexington, Mass.; training, Edwin Lyons, Amityville, N. Y.; transportation, William J. Lotzer, Milwaukee; Agriculture, John F. Neace, Phoenix; insurance and safety, B. G. Vandre, Winona, Minn.; technical trades, A. Biederman, Glendale, Calif., and miscellaneous, Robert Hudgins, Montgomery, Ala.; regional vice presidents — Edmund R. Dawson, Allentown, Pa.; Wesley B. Jackson, Lantana, Fla.; John Wilson, Northbrook, Ill.; J. O. Womack, Dallas; John Clinch, North Platte, Nebraska; Charles H. Branstetter, Jr., Sacramento, and George Kreitzberg, Salem, Ore. Sam Freeman of Bedminster, N. J., president in 1956, is chairman of the advisory committee of past presidents and Charles A. Parker, Washington, D. C., is executive director.

HELIO AIRCRAFT CORPORATION could sell its entire production in Central and South American markets if it so desired according to Lynn Bollinger, president. In a Flight Magazine interview last month, Bollinger reported that the short-field capabilities of the Helioplane, now

(Continued on page 18)

PORTABLE TELEVISION FOR BUSINESS PLANES is provided by this compact 10-inch Admiral, which weighs only 16.5 lbs. and is plugged into an inexpensive ATR converter providing maximum of 125 watts. Same converter also operates dictating machine, shaver, toaster and hi-fi radio. This one's in a Kroehler Manufacturing Company Lodestar, of which Robert Hanson is chief pilot.

Bendix AND ONLY Bendix



Offers a Complete Ignition System for JET ENGINES!

The most significant reason why the Scintilla Division of Bendix has long been recognized as the leader in aviation ignition is that Bendix-Scintilla designs, engineers and manufactures every component of the ignition system.

Obviously, components designed to work together give more efficient performance and require less attention in original installation or later service.

That is why Bendix and only Bendix offers the industry a complete jet ignition system, including, not only the ignition unit, but igniter plug leads, igniter plugs and control harness as well.

There just isn't any question about it—you get not only the best, but all of the best when you specify Bendix for your complete jet engine ignition requirements.

Bendix SCINTILLA DIVISION OF Bendix AVIATION CORPORATION
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Dearest Peg:

It's with heavy heart and tear-fogged optics that I write you the tragic news from Southwest Airmotive: After five glorious, glamorous years, SAC this month ends its world-famous "girl ads." However, I'm cheered by a pledge that their 1957 Silver Jubilee ads may be even more exciting--and not entirely un-feminine. I'm cheered, too, by five years of wonderful memories of all the lovely ladies who've smiled out at me from the nation's aviation magazines. God bless 'em every one! And a very special Christmas blessing to my own 20-year-old, 5'4", 115 lb., green-eyed, blonde daughter.

Love,

Daddy

NOTE: Daddy's right. This is it! Our grand finale here shows a princess representing each of our five series: L. to R., Sally Merrill, Dee Brock, Peggy Martin, Nancy Boyd Gibson, and Barbara Allard. AS A MEMENTO FOR OUR COUNTLESS FRIENDS, WE HAVE A FREE BROCHURE WITH ALL 12 "LETTERS FROM DADDY." THE SUPPLY IS LIMITED. WRITE NOW FOR YOURS!

SOUTHWEST AIRMOTIVE COMPANY • LOVE FIELD • DALLAS, TEXAS

Just among ourselves

The Payoff

THE Republican Administration, following the landslide victory of President Eisenhower in the November elections, has a brilliant opportunity to redeem itself at least partially for some serious bloopers in civil aviation policy by appointing capable men to two high civil aviation posts.

The two vacancies involve a Civil Aeronautics Board member appointment and a new Administrator of Civil Aeronautics following the death of Chuck Lowen.

It seems to us that Republicans and Democrats alike would someday wake up to the awful consequences of continually appointing unqualified men to the highest civil aviation posts in the land. We've reaped a harvest of confusion compounded in recent years all because competent and dedicated men have been passed over when it came to filling vacancies in high-policy positions. Department of Commerce control of the CAA and the Air Coordinating Committee has been little short of catastrophic. Couple the practice of appointing incompetent men to top positions with the maze of agencies, committees, commissions and advisory groups so numerous no one person can name them off without referring to the list, there's little wonder Federal civil aviation policy is approaching a state of bankruptcy.

Many Congressional and industry leaders believe that a complete overhaul of U. S. civil aviation legislation is necessary, including the divorcement of the CAA from the Department of Commerce. We concur with this view with the simultaneous admission however that had competent and experienced aviation men been appointed to top Commerce Department posts in the past there would have been some semblance of orderly and intelligent civil aviation development and considerably more stability within the Federal aviation agencies themselves. So it's a two-edged sword — modernization of our basic structure through Congressional action plus the appointment of dedicated, experienced leaders and administrators, some of whom could be garnered from career men in the agencies themselves.

On December 31 the term of CAB Member Joseph P. Adams expires. His record of dedicated government service demands his reappointment to a second term. But if the politicians should prefer to disregard his splendid record on the CAB they can not conscientiously overlook his technical aviation background as a military and civilian pilot, a former state director of aviation and the other direct, non-theoretical lifetime experience in aviation — a background rare in the annals of CAB appointments and one which gives balance to the present 5-man quasi-judicial Federal agency from whence comes most of our top-level aviation development, especially in safety and in regulation and expansion of our air transport systems.

There are good men in the ranks of CAB's working force who might give strength to the Board by appointment as a full member, bringing to it long years of experience in staff work which no Board member has ever had. Such a candidate would be Thomas L. Wrenn, assistant chief examiner who has been in the CAB ever since its creation. We doubt if there are a dozen men in the country with more knowledge of the government's role in aviation development and the peculiar economics of airline operations than Tom Wrenn. His name has been mentioned in these and other columns before and it is a privilege to mention it again as the type of dedicated government servant we should like to see elevated to Board membership for the good of the nation.

As for the vacancy in the Administrator's chair over at the Civil Aeronautics Administration the situation is not so acute. In recent years inept Department of Commerce political appointees have been running the CAA much to the discredit of the Republicans. It won't matter much who gets the post until the present spooks are shorn of their power. Right now Acting Administrator Jim Pyle, despite his limited civil aviation experience, has demonstrated both energy and ability and a sincere desire to do a bang-up job during his brief weeks at the post. The name of James D. Ramsey of Nebraska has been prominently mentioned in civil aviation circles as a grassroots candidate for the job and we know from long association with Ramsey that he is eminently qualified if Pyle's political support isn't strong enough to cinch the job.

If Mr. Eisenhower wants to be a hero in aviation he certainly has the opportunity now to make some aviation appointments based on capability and dedication rather than political expediency. We shall see what we shall see.

Progress Is Earned

THERE are literally scores of successful formulas for building or improving community airports but there's one ingredient absolutely necessary to any successful program. It's the backing of civic leadership in the town. Without it there can be no progress at all.

An outstanding case of civic support in the field of airport development recently came to light in Muskegon, Michigan, where a small group of businessmen quietly optioned for the county enough land for an adequate terminal airport that will replace the present hemmed-in and dangerous facility constructed more than a quarter of a century ago. The land acquisition at an entirely new site resulted from a study by a competent airport engineering and consulting firm which proved that a completely modern airport could be constructed for less money than would be required to expand the present airport. By quietly optioning the land, the Muskegon businessmen saved the taxpayers uncounted thousands upon

thousands of dollars had a land boom been set off prematurely. The local newspapers did not "leak" the story and consequently were partners in the community effort to solve a knotty airport problem.

Greater Muskegon businessmen who "went out on a limb" with their own money to get the land are C. J. Reese, Continental Motors Corporation; Donald Seyferth, Newaygo Equipment Company; Ernest Cooper, Clarke Sanding Machine Company; Harold Frauenthal, Kaydon Engineering Corporation; Otto Seyferth, West Michigan Steel Foundry Company; John P. Sheldon, E. H. Sheldon Company; Ted Operhall, Misco Precision Casting Company; and Paul C. Johnson, Sealed Power Corporation.

An interesting sidelight to this exceptional case of community airport support is the fact that most of the civic leaders involved have been active in the Muskegon Chapter of the Aero Club of Michigan, where, no doubt, they became familiar with the value of adequate airport facilities to their city. Isn't it regrettable that there aren't more communities like Muskegon, blessed with civic-minded citizens who realize that progress is not automatic, that it has to be earned?

Proud Moment

THE general aviation operations survey made during a 48-hour period on October 26-27 on 900 U. S. airports resulted in the tabulation of over 100,000 aircraft movements of every type and description and in all kinds of weather. The survey was made as a part of a study undertaken by 12 national aviation associations working on a report for President Eisenhower's special assistant for aviation facilities planning, Edward P. Curtis.

It will be several months before the mass of information acquired during the two days by over 1,000 volunteer workers can be scientifically punched out on cards and correlated into definite operating information. The national research firm directing the survey announced that never before in all research history has there been such tremendous response and such a high percentage of returns. "Researchers everywhere, and that includes our own staff, are agast at the returns," one of the researchers told the General Aviation Facilities Planning Group at a recent meeting in Washington.

The survey will provide factual information never before available on the complex and heterogenous operations of business, industrial, agricultural and pleasure flying involving some 60,000 active civil aircraft. With these concrete facts and statistics available it is certain that general aviation will receive more consideration in all facilities planning and aviation policies at high levels of government. Little wonder with the stakes so high that so many volunteer workers — airport managers, state aviation officials, pilots, CAP'ers and operators turned out en masse to get the job done.

It is a real feather in the cap of general aviation that the largest segment of U. S. aviation from the standpoint of numbers of people and machines involved in the airspace problem were mobilized on such short notice and came up with the most successful industry research operation ever accomplished. It was a proud moment in civil aviation history that will have far more important implications than the mass of vital facts and statistics acquired. The age-old fear that any one segment of U. S. aviation can or will take over the airways and airports to the detriment of other segments has been blasted to bits.

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examination is more than skin-deep!

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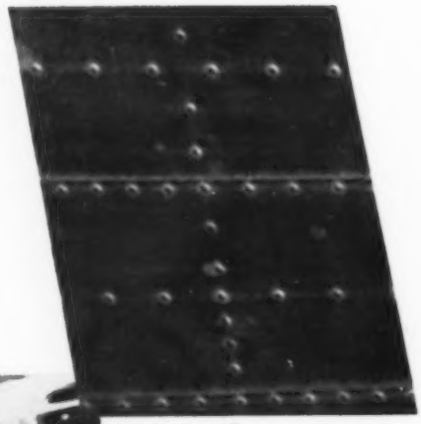
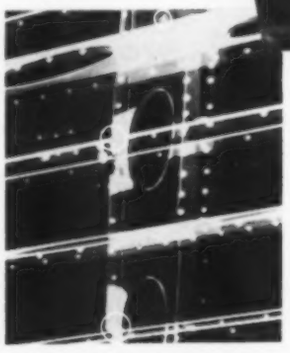


PHOTO—LOOKS PERFECT

Here's how section of horizontal stabilizer in the tail of a DC-3 looked to the eye.



X-RAY—HIDDEN FAULTS

See what X-ray inspection of the same section disclosed — trash, crack, misplaced rivet.

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This Automatic Direction Finder offers accuracy and reliability proved in more than two years of testing – yet the entire 5-unit system weighs only 19.7 pounds. Now you can have a DUAL installation where required – at a weight saving of 80 pounds or more.

The ADF still is the world's Number One navigational aid, usable on an estimated 60,000 radio stations. Now you can have ADF featuring ARC standards of performance and reliability. This system incorporates hermetic sealing of critical components such as the entire loop assembly. It also has other mechanical features designed and tested for dependability under today's higher speeds and more exacting operational and environmental conditions.

The Type 21 ADF covers all frequencies from 190 kc to 1750 kc. It requires less power – only 2.8 amps at 27.5 volts dc input. Extremely low drag of the loop is an outstanding feature. Housing extends only 2 inches from the skin of the aircraft.

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Component Units Weights: Receiver, 6.8 lbs.; Loop, 4.3 lbs.; Loop Housing, 0.5 lbs.; Control Unit, 1.6 lbs.; Indicator, 1.3 lbs.; Power Unit, 5.2 lbs.;
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Here's one of 250 Lycoming VO-435-A1B helicopter engines currently being overhauled by Dallas Airmotive. Left to right are Lycoming Service Manager Sterling Shimer; Dallas Airmotive President Don Goldammer; Charles Lytle, Dallas Airmotive plant manager; Joseph Diblin of Lycoming and Jack Morris, Dallas Airmotive test foreman.

Dallas Airmotive Overhauling Helicopter Lycomings

A MONTHLY production level of 500 engine overhauls a month has been attained by Dallas Airmotive, which overhauls more aircraft engines than any shop in the world, and now the firm is overhauling 250 Lycoming VO-435-A1B helicopter engines used in the Bell 47G and 47J. In the past, it has overhauled P & W R-1340 helicopter engines. Other engines it specializes in are the R-985, R-1340, R-1820, R-2000, and R-2800-CA and CB. Helicopter engines are tested in the vertical position as easily as other engines in the horizontal position. Test clubs simulate rotor loads.

AIR REPORT

(Continued from page 12)

being manufactured in Pittsburgh, Kansas, "is taking Latin America by storm."

JAMES S. PEDLER, who retired last month after more than 30 years with the B. F. Goodrich Company as manager of aviation sales, has joined the Cleveland Pneumatic Tool Company. Pedler served with the old U. S. Signal Corps aviation section during World War I. Known far and wide throughout aviation as a veteran pilot and sales executive, Pedler will handle special assignments for Cleveland Pneumatic, major component supplier to the aviation industry.

NORTH AMERICAN TWIN-JET UTILITY TRANSPORT AND COMBAT READINESS TRAINER will be ready for demonstration to the military by early 1958. It has commercial business flying possibilities and is being developed and built at company expense.

Mileage Cheaper in Fairchild Jet Than Lodestar or DC-3

Jet business planes will be priced higher than piston-powered planes but they promise lower per-mile costs because of their high speeds. For example, a $950,000, 500-mph. Fairchild M-185 ten-place jet business transport will cost 15 cents a mile less to operate than a $250,000, 220-mph. Lodestar and 41 cents a mile less than a $300,000, 200-mph. DC-3 — if all three are operated 600 hrs. a year.

Figures are furnished as proof by Stephen L. Brown, chief pilot for Continental Can Co., which has 3 of the Fairchild jets on order. He says they will enable the company to fly 50 per cent more miles annually than its existing fleet of five piston-engine transports. Brown computed his figures by using the Air Transport Association's airline cost formula, although he doubled the formula's per-mile fuel cost because business air-

Shell Oil Company Photo

Business today still has its outposts and its new frontiers. And wherever they are, there are the helicopters, exploring, patrolling, transporting men and supplies, ferrying progress itself. Over glaciers and mountains, across flat and shimmering deserts, or out to sea — where men have seldom been before, helicopters take them as a matter of course. More often than not, they are Hawk Helicopters.

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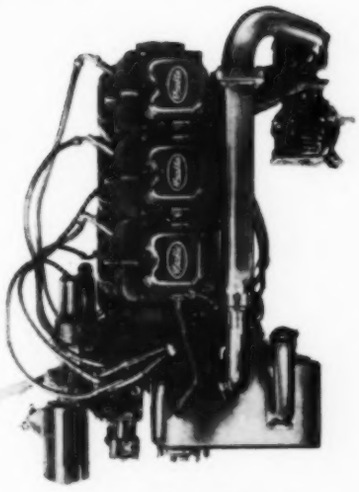
NO ONE CAN MATCH THIS EXPERIENCE

We have produced 5279 helicopter engines*



This is more helicopter engines by far, we believe, than have been produced by any other manufacturer, regardless of make or horsepower. At least 75% of all the helicopters under 400 h.p. flying today have Franklin engines.

We make this statement, not to boast, but to emphasize the vast background of practical experience we have to offer users and makers of light helicopters. It is solid evidence, we think, that no other helicopter engine can match Franklin for reliability combined with low operation and maintenance cost.

It will pay you to specify Franklin power in your next light helicopter. If you have a helicopter power problem, all of our knowledge is at your disposal.

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PROMINENT AVIATION LEADERS AT NATIONAL AVIATION TRADES ASSOCIATION CONVENTION in St. Louis last month included (left to right) G. B. Van Dusen, president of Van Dusen Aircraft Supplies; Hall Hibbard, Lockheed Aircraft vice president-engineering; George R. Galipeau, Van Dusen vice president; James T. Pyle, acting CAA Administrator, and Brig. Gen. Walter R. Agee, Civil Air Patrol commanding general.

craft operators buy their fuel at retail prices. His figures are based on 600 hours utilization per year, 10-year amortization for the M-185 versus 4-year amortization for the piston-engine aircraft. Here are his figures:

In 600 hrs., the Fairchild M-185 will cover 300,000 miles at a total annual cost of $315,000 which averages $1.05 per mile flown or $525 per hour.

In 600 hrs., the DC-3 will cover 120,000 miles at a total annual cost of $175,000 which averages $1.46 per mile flown or $252 per hour.

The Lodestar will cover 132,000 miles in 600 hrs. at a total annual cost of $158,400 which averages $1.20 per mile flown or $264 per hour.

In other words, if a company needs to cover 300,000 miles annually in its business travels, the jet is the answer and its costs are reasonable, Brown contends. His company is the first to order the M-185, buying three. It has also ordered a Fairchild F-27 turboprop.

LESTER DURAND GARDNER, 80, founder of the Institute of the Aeronautical Sciences and former publisher of Aviation before it was sold to McGraw-Hill, died last month in New York. . . . **CAPT. RICHARD L. (DICK) DOBIE**, with United Airlines 28 years before he retired in 1955, died last month of a heart ailment in San Antonio. He was 61. Dobie began flying in 1917 with the Army at Kelly Field, flew the first mail on National Air Transport's Kansas City-Dallas route.

BENDIX AIRBORNE RADAR is being installed in Vickers Viscounts now being delivered to Capital Airlines.

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The world's finest, quietest, longest-range aircraft. Opening a golden era in air travel. Newest and finest in flying luxury.

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SOLO FLIGHT IN BEECH TWIN-BONANZA on 16TH BIRTHDAY is the distinction held by Jack Outland, son of Earl Outland, co-owner of Abilene Aviation at Abilene, Texas, Beechcraft dealers. His father was his instructor and says Jack actually had logged some 300 hours before solo, which was delayed until he reached the minimum age limit. Another son, Bill, also soloed on his 16th birthday and is now with the Air Force in England.

SAN FRANCISCO BAY

Heralding a golden age in air travel

From coast to coast, from town to town, nothing comes close to the exciting new 280 mph Fairchild F-27. It opens a new era in air transportation.

Air travelers will bridge the miles in air conditioned comfort in the F-27's spacious pressurized cabin. The Rolls-Royce Dart airline proven propjet powerplants are hushed and virtually vibrationless. Passenger visibility is unexcelled.

And the F-27 propjetliner is so flexible in use. Seating up to 40 passengers as a high density transport, it also stars as a practical flying company conference room for executives on the go, or for critical cargo on the move.

Address inquiries to: R. James Pfeiffer, Executive Director of Customer Relations, Fairchild Engine and Airplane Corporation, Hagerstown 15, Maryland.

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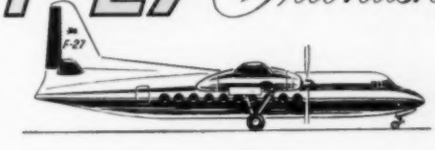
F-27 *Friendship*



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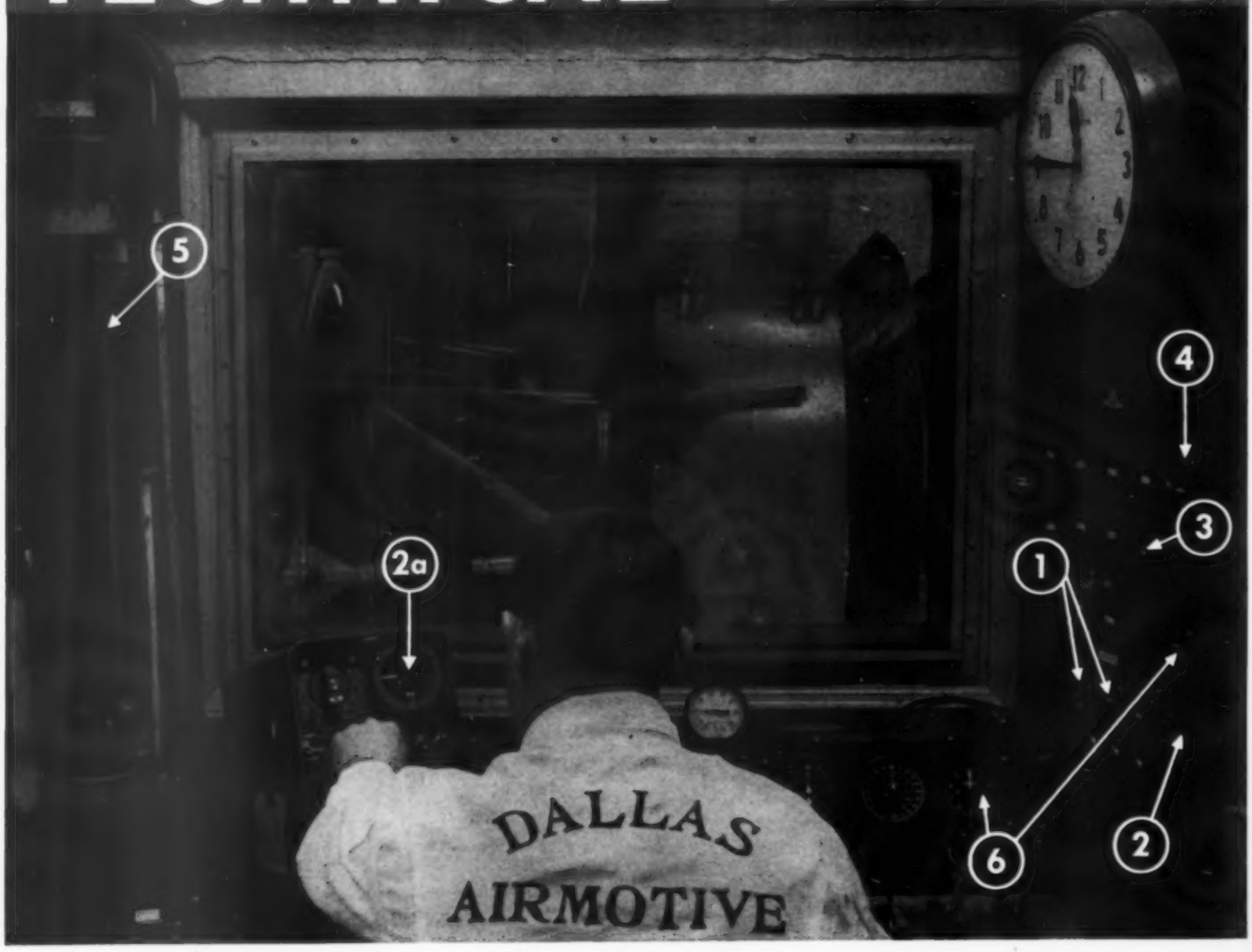

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Dallas Airmotive makes an individual study of all of these factors during each performance test. The latest types of analytical equipment are used for an average of four hours on each test and from these comes the assurance that the engine will operate SAFELY, SMOOTHLY and SATISFACTORILY. For Reliably Tested Engines — For Reliable Engines, It's Dallas Airmotive.

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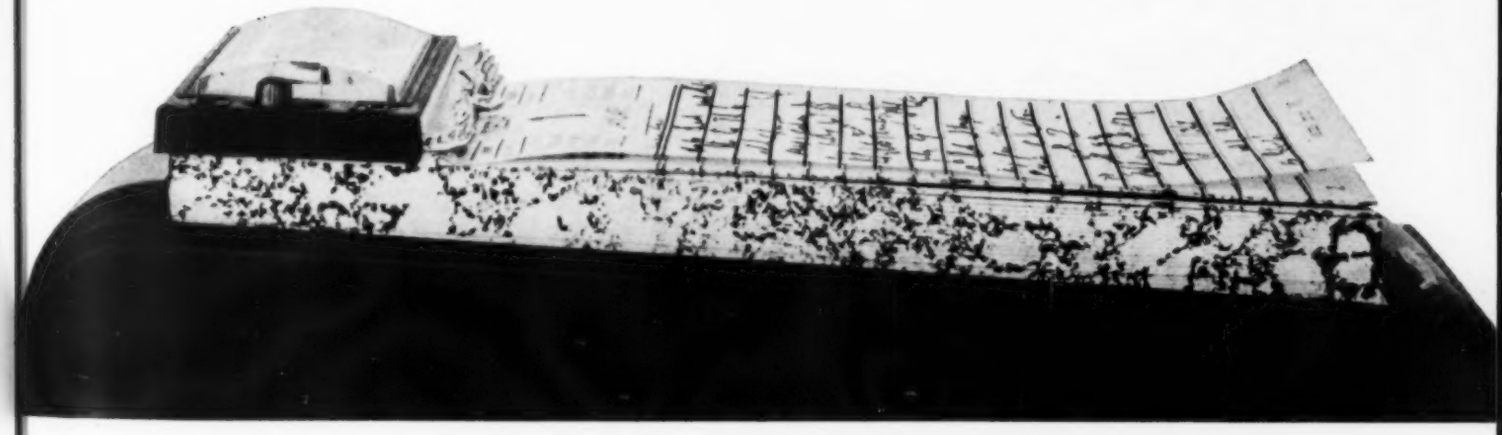
Piper Apache puts you on top of a busy calendar



and **LEAR** keeps you there day after day!

Here is a sleek new bird-of-business that combines twin-engine reliability with single-engine maneuverability and economy. To help meet its schedules easily, dependably, even when unexpected "weather" rears its ugly head, the Piper Apache features Lear autopilots, radio, and navigational instruments as factory accessory equipment. The Lear ADF-12 is standard on the Piper custom Apache. All Piper Apache models are designed to incorporate Lear automatic direction finders, Lear omnirange navigational systems, Lear VHF communications, and Lear autopilots.

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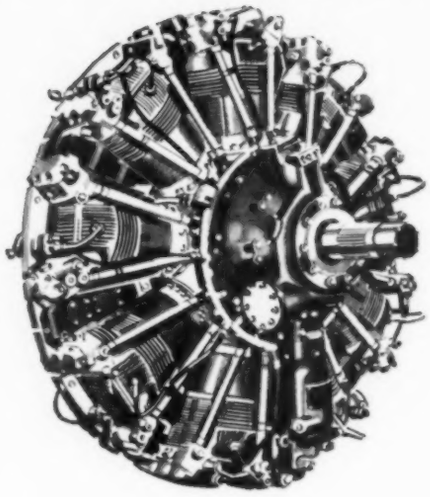

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powered by

CYCLONE 9

ENGINE

is the first to make a non-stop transcontinental helicopter flight

The first helicopter to fly non-stop across the U. S. —a U. S. Army Vertol H21—proved again the rugged reliability of the world-famous Curtiss-Wright Cyclone 9 engine. Refueled several times in flight and twice while hovering above the ground, the Army's biggest helicopter flew 2,610 miles from San Diego, Cal. to Washington, D. C. and stayed aloft for thirty-seven hours, proving the strategic value of the helicopter in increasing the long-distance striking power and mobility of ground forces.

This cross-country flight is the most recent in a long list of record-setting performances by aircraft powered with the Cyclone 9—an engine type with a 20-year record of outstanding performance. The specially engineered Cyclone 9 for helicopter service is an engine built for today's big lifts . . . for the rough-and-ready service of the military . . . for the vital work of rescue, supply and civil defense. Its power and dependability have also given new scope to the helicopter concept for commercial aviation.

The Cyclone 9 is another example of Curtiss-Wright's leadership in aircraft power for the needs of today and tomorrow.

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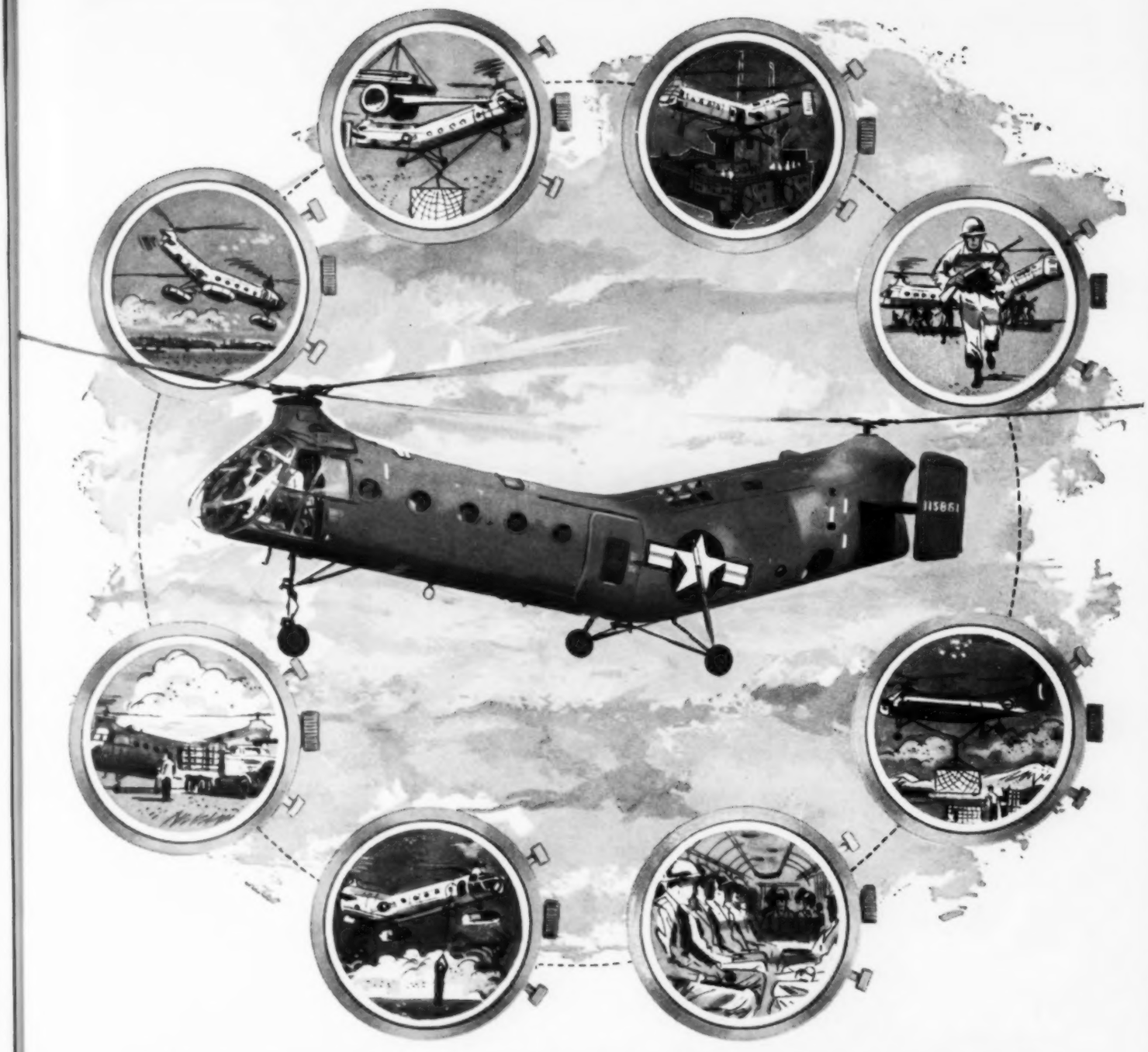

NOW A COMMERCIAL "WORKHORSE"

The familiar H-21 "Workhorse" helicopter, symbol of 'round-the-clock military mobility, will soon fly in a civilian version.

This new helicopter grows out of the massive flying experience of hundreds of H-21's – now in service in many parts of the free world. Over 50,000 hours of flight time have been accumulated by the H-21's delivered to date.

A key factor in military logistics in the U. S., Canada and France, the H-21 is being certified for civil use.

The commercial version, the Vertol 43, will seat up to 20 passengers in its long, airliner-type cabin – will be able to airlift up to 5000 lbs. of high-priority cargo.

In versatility, in performance, in reliability, it will match its military counterpart – around the world, around the clock.

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Engineers, join Vertol's advanced engineering team!

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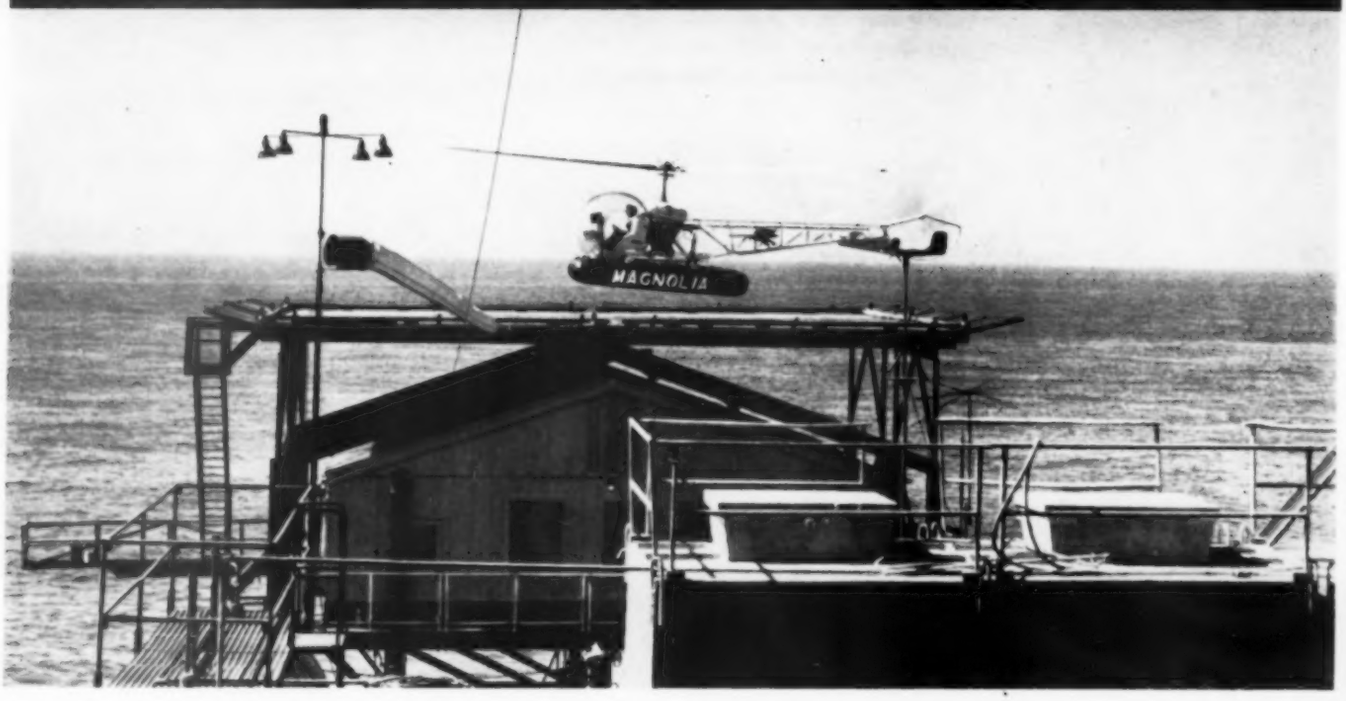

Magnolia's Bell helicopter uses a 50 by 50 foot platform atop crew quarters in the Gulf of Mexico.

Wherever off-shore drilling platforms are in use, a profitable partnership may soon be established between oil companies and helicopters for use in business flying. First of the oil companies to equip an off-shore drilling platform for use as a landing field *for its own helicopter* was Magnolia Petroleum Company. This may pioneer a whole new field of business flying. As for the men who fly the helicopters, they agree:

For Top-Flight Performance — Make it **Mobil** **Aviation Products**

	Military Specifications
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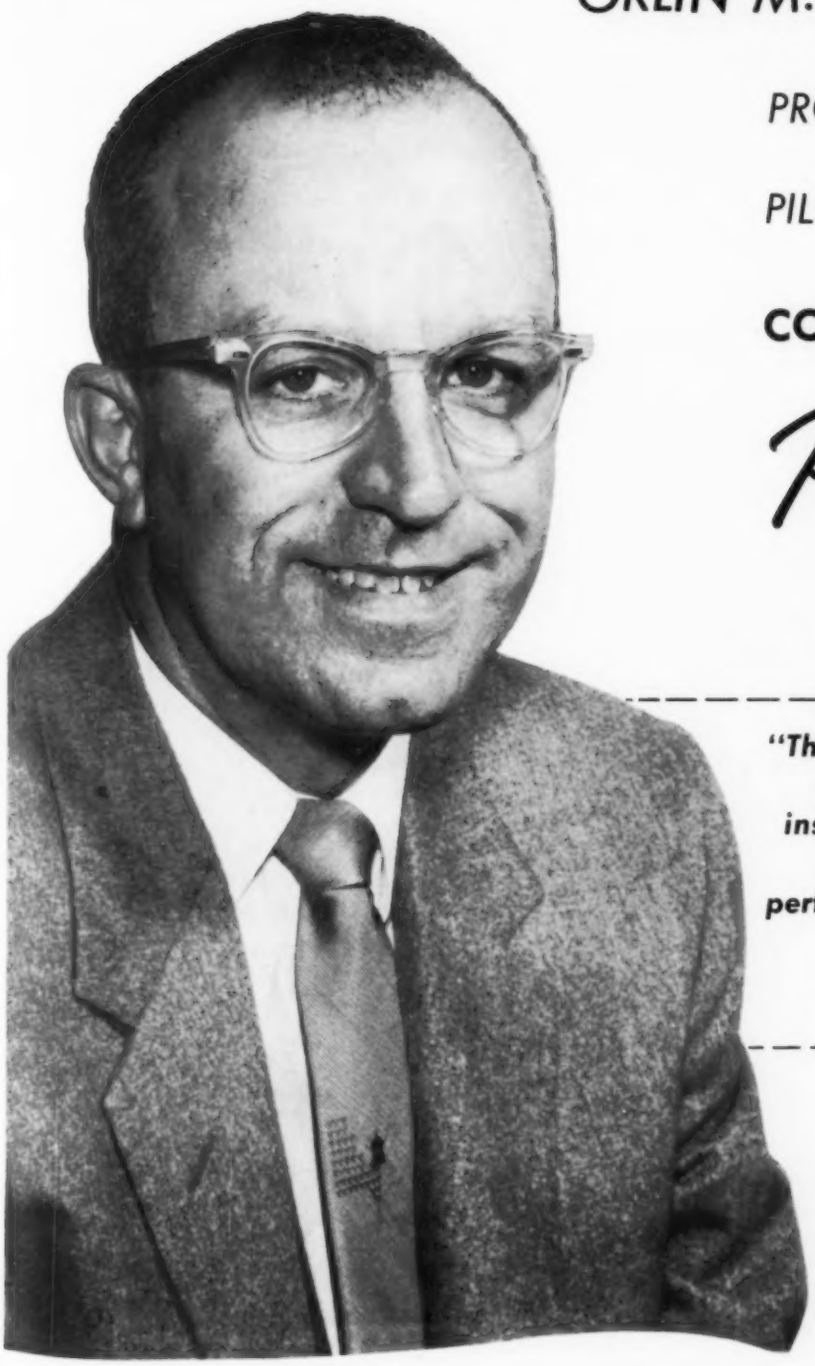

"The greater speed of the Commander 680 saves us hours instead of minutes — while the higher altitude, single-engine performance is a great safety factor."

Orlin M. Sorensen

Orlin Sorensen, chief pilot for Signal Oil and Gas Company of Los Angeles, has a record of business, transport and military flying that pre-dates World War II. His globe-wide experiences qualify him for flying and directing the Signal air fleet to business appointments throughout the country.

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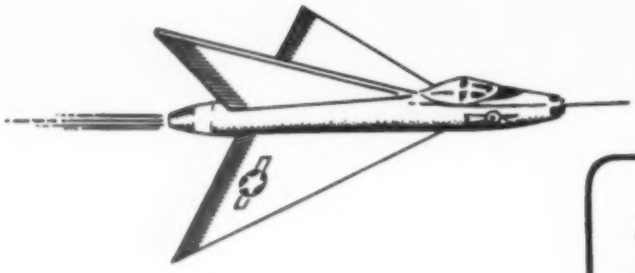

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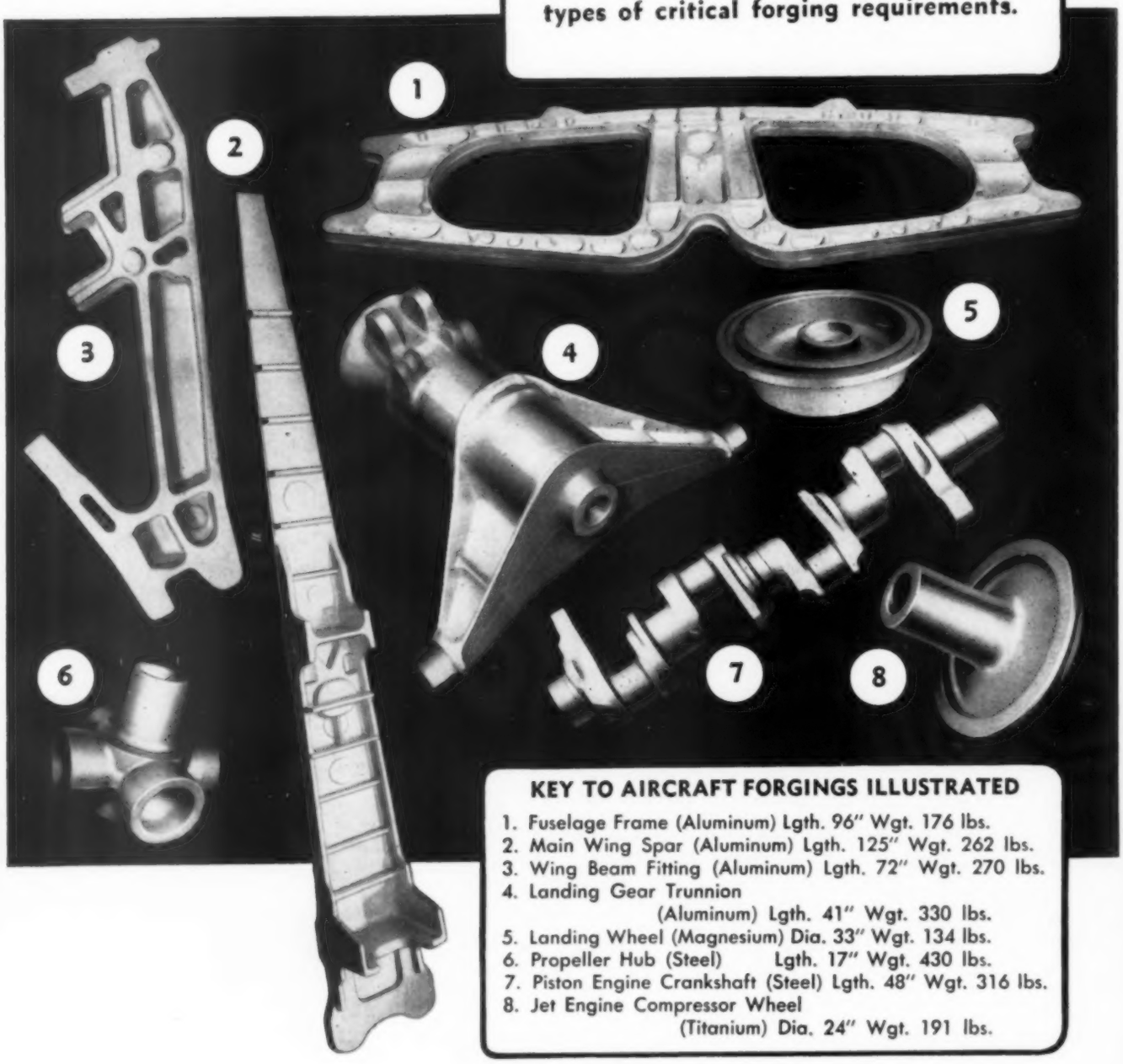

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First integrated turbine-powered helicopter design is the U. S. Army's 6-place XH-40 being developed by Bell Aircraft and shown above on its first flight recently. It is powered by the new T-53 Lycoming turbine, rated in the 800-hp. category and weighing close to 500 lbs. The H-40 will gross between 5,000 and 6,000 lbs. with useful load exceeding 2,000 lbs. A field test production quantity has been ordered. A free-shaft turbine, the T-53 eliminates clutch and fan. New standards of mechanical integrity are promised by the H-40, including 1,000-hr. overhaul periods. (Bell Aircraft Photo).

Turbines For Better Helicopters

HELICOPTER development has reached a major turning point in current experimental projects replacing piston engines with new and efficient shaft turbine power plants. There are four of these projects at present, using 800-1,000-hp. turbines — the Lycoming T-53 and the General Electric T-58. The Lycoming powers the new 6-place Bell XH-40 utility helicopter, which has made its first flight, and has also flown in an experimental Kaman HOK flying test-bed installation. Yet to fly are a Sikorsky project adapting two GE T-58's as the twin power plants for an S-58 transport and an installation of two T-58's in a turbine version of Vertol's H-21 transport.

It is the multi-engine configuration which looms greatest in the hopes and aspirations of helicopter operators. Copters are essentially high-utilization machines but single-engine copters are piling up only 500-1,000 hours or so annually. No multi-engine copter is available commercially and operators can not hope to push their utilization figures up to the airlines' 3,000-hr. annual mark or more until twin or tri-turbines become a reality. The turbine's light weight and high power characteristics make it superior to the piston engine for the perfection of multi-engine helicopters and availability of the new Lycoming and GE makes the prospects practical for the first time.

It is the single-turbine Bell XH-40 project which launched the big push to turbines, however, for perfection and production of the Lycoming are tied into that multi-million-dollar U. S. Army undertaking. It is the nation's only all-new and integrated helicopter design project at the present time and its success will greatly influence future programs. As yet, the GE turbine has not been ordered into production or dove-tailed into a new copter design undertaking. Its helicopter application is currently limited to modifications for the Sikorsky and Vertol. But these projects are of importance because they are transport-

A Kaman HOK-1 flew recently as a flying test-bed for a Lycoming T-53 turbine installation. HOK is normally powered by a 600-hp. piston engine. An Air Force contract for this modification calls for a 50-hr. flight approval test and involved a minimum of changes as a test-bed. Kaman says the turbine installation doubled the HOK's useful cabin volume and provides for a lower empty weight and higher gross weight. Details have not been released.

Vertol H-21 is being modified in an experimental project with two 1,000-hp. General Electric T-58 turbines replacing its single 1,425-hp. Wright piston engine, as indicated here. Both turbines will be shafted into a single rotor drive system for engine-out capabilities. Turbine configuration will be designated H-21D and will be certificated for commercial as well as military operation. It seats 18 to 21 including crew and will have a useful load exceeding 6,000 lbs. at a 14,000-lb gross.
—(Vertol Photo.)

type helicopters of production-line and field-proven integrity.

The first successful multi-turbine commercial helicopter will be a Sikorsky S-58 powered by two GE units. Its experimental turbine installation is being engineered to make feasible retrofits for piston-powered S-58's already delivered. When the T-58 turbine becomes available in sufficient quantities, it will be installed in all future S-58 helicopters — both military and commercial. It is known that some current purchases of commercial S-58's are based on the promise that turbines will be available for them as power-plant replacements. By this relatively simple process, the single-engine Sikorsky will be converted into a twin having engine-out capabilities for greatly-increased utilization. It will also gain more cruising speed and a significant 25 per cent increase in payload. With its single Wright R-1820 piston engine of 1,525 hp., the 12-14-place S-58 grosses 12,700 lbs., has a 5,140-lb. useful load, carries 198-208 gals. of fuel, cruises 101 mph. and costs $248,000. No design specs or performance are available for the turbine configuration.

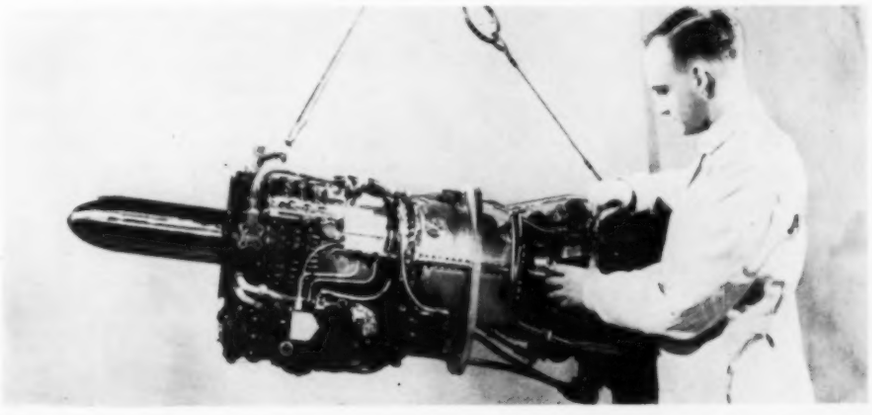
Vertol is more specific about anticipated gains in converting its H-21 by the installation of the two GE T-58's. As the H-21D, being developed under a joint Navy-Army contract, it will be expected to offer a 40 per cent increase in payload and boost cruising speeds 50 mph. to 150 mph. This combination of gains will more than double the ton-mile-per-hour capability of the H-21. Hovering ceiling will be increased by "several thousand" feet. On the basis of these design goals, the H-21 and H-21D are expected to compare as the following numbers indicate:

	1-Engine Wright H-21	Twin Turbine H-21D
Hp.	1,425	2,000
Gr. Wt., lbs.	13,500	14,000
Useful Ld., lbs.	4,700	6,580
Cr. Spd., mph.	101	150
Ceiling, ft.	10,000	14,000

There are several factors which might affect the projects utilizing the GE turbine. Although this engine has been discussed widely for its possibilities, no production contract had been issued for it as of December 1. It weighs 325 lbs. or more including the reduction gear. This makes for a remarkable power-weight ratio and the engine probably will produce more than the 1,000 hp. which is quoted for it.

The Lycoming T-53 will weigh closer to 500 lbs. for its rating of some 825 hp., and this will make it a heavier engine, even with its rating boosted up to about 1,000 hp. or more. Dimensions appear to favor the GE but when all accessories are installed, the two tur-

(Continued on page 40)



Two GE T-58 turbines are being installed in a 12-14-place Sikorsky HSS (S-58) to replace its 1,525-hp. Wright piston engine and offer engine-out twin-turbine performance. The T-58 is shown at right. Two turbines (at 325 lbs. each including reduction gear) will weigh less than the one piston engine and deliver more than 2,000 hp. A 25% increase in payload is expected, with higher cruising speed. Successful bench tests were concluded recently with approval to power experimental aircraft. The T-58 is a Navy development.
—(Sikorsky and GE Photos.)

Bell XH-40 turbine-powered utility Army helicopter will undergo the most extensive testing ever given a new design. Here's an XH-40 in tie-down test, which will involve hundreds of hours of operation before completion. Three X models and six Y models for field test have been ordered by the Army in the multi-million-dollar development project. A close-up of the Lycoming XT-53 800-hp derated turbine is shown below in the XH-40. —(Bell Photos.)

Testing Key To Helicopter Development

TEN years ago there were only a few helicopters in military service and only one model, the Bell 47, was CAA certificated. New in service, these helicopters had limited component life and short overhaul periods. But helicopter engineers have now perfected design techniques and test procedures so that today, for the first time, it is possible and practical to produce a new helicopter design in a minimum of time with greatly improved dependability and low maintenance requirements.

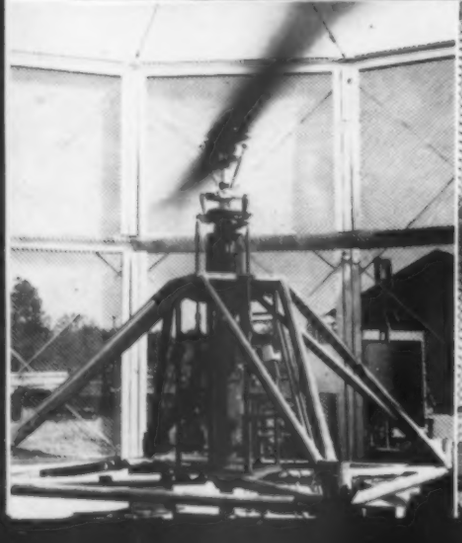
Pioneering a new generation of helicopters under modern techniques is the Army's Bell XH-40 turbine-powered 6-place utility helicopter. It will offer 1,000-hr. overhaul periods as compared to the maximum of 600 hrs. between overhauls available only in the Bell Model 47 as a result of its long years of evolutionary development and field service.

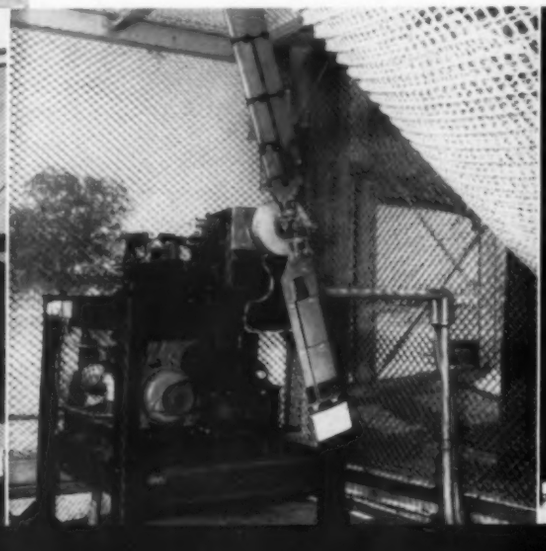
Exhaustive ground and flight test techniques assure that each major dynamic component of the new helicopter is perfected before production is initiated. In the XH-40, a comprehensive experimental test program is being conducted to assure its dependability without a long, evolutionary product perfection process, based on field service experience. More than two years of testing and many millions of dollars will go into the XH-40 before it is released to the military — the test program alone can exceed the combined costs of design, tooling and fabrication of the first three prototypes.

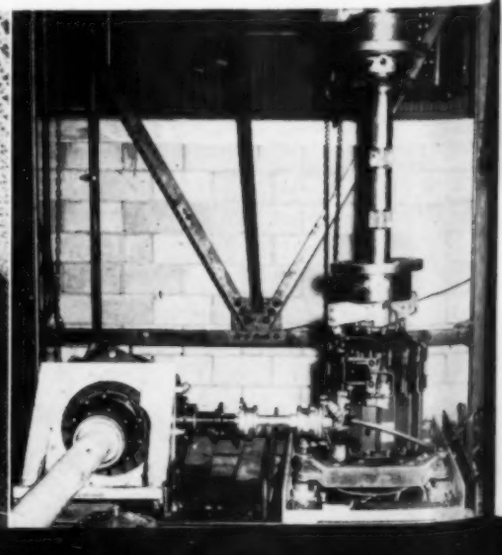
Helicopter development tests today include all the familiar airplane-type

(Continued on page 66)

Landing gear (left) and main rotor, tail rotor and transmission tests in the XH-40 project are shown in these photos. Goal of the XH-40 is a minimum of 1,000 hrs. between overhauls and minimized maintenance. These tests call for hundreds of hours of actual running. The tail rotor whirl test is for 50 hours specified plus extended tests with flight loads at high power absorption. Main rotor system whirl tests include all conditions of horsepower, rpm., cyclic and collective pitch including maximum overspeed. —(Bell Photos.)







Bell Installs Decca Chain

By HARRY W. MITCHELL
Instrument Flight Group Engineer,
Bell Aircraft Corp., Texas Division

BELL Aircraft Corporation is participating in a cooperative program with the Pacific Division of the Bendix Aviation Corporation to erect a Bendix-Decca Navigator Chain in the Fort Worth area. This extremely accurate navigation system will serve a useful purpose for each company and the program results will eventually benefit both military and commercial helicopter operations. Bendix Pacific will have an operating Decca installation that they can demonstrate to all interested parties with a minimum of red tape, since it's a cooperative venture with private financing. Bell, on the other hand, will have a very fine tool for their helicopter instrument flight research program and will provide the demonstration and research helicopters.

The Decca Navigation System is actually an American invention. It was developed by William J. O'Brien, who was later aided by another American, H. F. Schwartz. It remained for the British, however, through the efforts of the Decca Navigator Company, to develop this system for use by the Allies during the D-Day landings in Normandy. The system was first installed in minesweepers which cleared the way for the other landing craft and helped to pinpoint the exact landing locations for the various units. It wasn't until after the war, however, that units suitable for use in aircraft were developed. The first ones were well over one-hundred pounds in weight and were far too heavy for the lighter helicopters. The first system to be tested and demonstrated by the Bell-Bendix Program will be a new 40-pound system that has been expressly designed and built for helicopters.

The Decca system provides a pattern of hyperbolic position lines which are generated by the relationship of transmissions from a master station and three slaves known as the red, green and purple stations. Control equipment at the slave stations ensures accurate phase synchronism between the transmissions. This results in the production of a pattern of stationary waves that occupy precisely known and stable geographical positions and thus form navigational position lines. A fix is provided by the intersection of two position lines. The four transmitting stations produce three patterns which are over-printed on maps and charts and numbered in red, green and purple. The position lines or phase relationship between these various wave fronts are detected by a receiver aboard the helicopter and the position information is computed and then displayed by decometers or by the Decca

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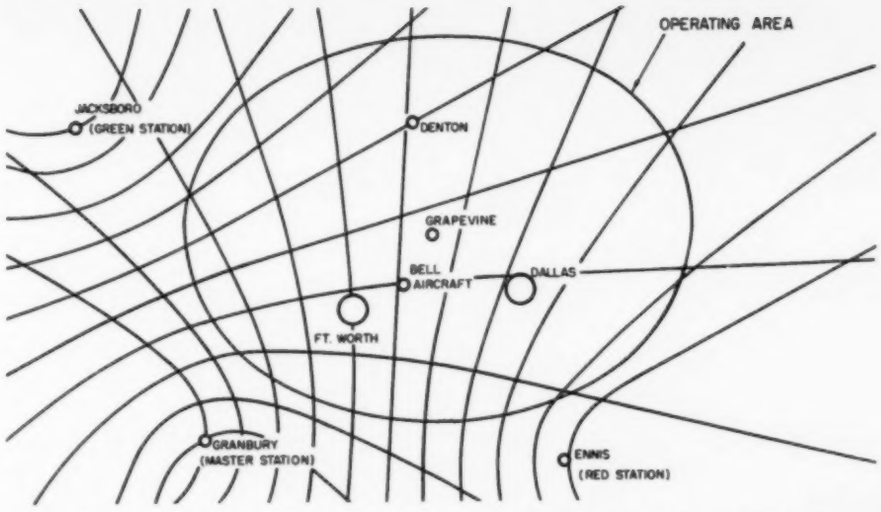
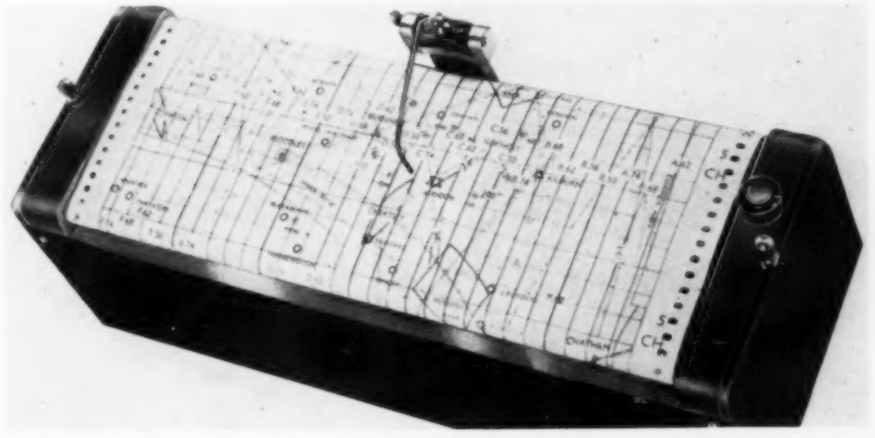


Except for the large circle, which denotes the general operating area of Bell Aircraft's helicopter instrument flying project, the lines on this map of the Dallas-Ft. Worth area are hyperbolic position lines provided by transmissions from a master Bendix-Decca transmitter at Granbury and two slave transmitters at Jacksboro and Ennis. Bell's system uses only two slaves, whereas three are normally used.



Here's one of two types of Bendix-Decca Flight Logs, which feature a navigation chart on which a stylus tracks aircraft position at all times from ground transmissions. Another type Bendix-Decca log is pictured in the Bendix exhibit below, right. Behind it are four decometers which also interpret the wave transmissions to pinpoint aircraft position.

Here's a Sikorsky S-55, one of 27 helicopters operated by Petroleum Helicopters of Lafayette and New Orleans, La., with a load of workers for the offshore drilling rig behind it in the Gulf of Mexico. In the recent Hurricane Flossy, a Petroleum Helicopters S-55 flown by Joe Bolen rescued 45 workers in the Gulf, 12 from a rig which had no platform. They tossed equipment overboard, some of it cut away with welding torches, to make room for his landing even though the rig was listing badly and being pounded by 15-ft waves. Both rescues took less than 3 hrs. Bolen then hauled fuel drums to shore points where Coast Guard S-51 helicopters operated until winds exceeded 70 mph.
—(Petroleum Helicopters Photo.)

Big Business For Operators

WHILE air transport and influential military leaders continue to deplore the lack of giant 30-50-passenger multi-engine transport helicopters and huge helicopter cranes capable of lifting 20 to 40 tons of cable suspended cargo through the air at 100-mph. speeds, scores of commercial operators have built successful enterprises with small and medium helicopters throughout North and South America and around the world.

This Economy Pest Control helicopter, a Bell 47, is shown spraying brush killer for Weyerhaeuser Timber Company near Tacoma, Wash. Economy is the largest agricultural helicopter operator.
—(Bell Photo.)

There are three certificated helicopter airlines in the United States, operating in Los Angeles, Chicago and New York but these are developmental projects with the Civil Aeronautics Board footing a subsidy bill which is now running almost $3,000,000 a year. These operations are considered a low-cost, limited government investment in the unknown but potentially tremendous public benefits from helicopter transportation which can only be established by operating experience.

Of many non-airline commercial helicopter operations, several have grown into large enterprises in recent years. Perhaps the busiest of these is Petroleum Helicopters of Lafayette and New Orleans, Louisiana, which specializes in commercial airlift services for the oil industry throughout the coastal marshlands and tidelands. This firm has flown more than 60,000 revenue hours since it began operating in 1949 — most of this in the last two years. This year, for example, Petroleum Helicopters will fly 25,000 hours, averaging some 2,000 hours per month.

Petroleum Helicopters operates 27 helicopters — 23 small three-place Bell 47's and 4 eight-place Sikorsky S-55's. Thirteen of the Bells are operated in Colombia, South America, where Petroleum Helicopters has three major contracts. Ten Bells and the four Sikorskys serve eight major contracting firms along coastal Louisiana. Rates are negotiated in each case and depend on numerous factors, but in round numbers, $90 hourly for a Bell and $180 hourly for an S-55 can be considered representative.

Petroleum Helicopters has a staff of 115 employes. Mechanics outnumber pilots, there being 50 mechanics to 40 fliers, because a high standard of maintenance is a necessity for the large volume of flying which is done. Utilization of helicopters is averaging about 60-70 hours a month for each of the Bells and 148 hours a month for each of the Sikorskys. These figures add up to about 600 hours a month for the S-55's and 1,400 hrs. a month for the Bell 47's.

Most of this flying services offshore

Rick Helicopters operates a large fleet of commercial machines on numerous projects in the United States, Canada and Alaska. Here's a Bell operating as a crop duster.
—(Bell Photo.)

drilling rigs located as far as 70 miles out in the Gulf of Mexico, where waves make it difficult to operate from small boats and slow boat speeds in good weather make surface transport too time-consuming in the dependable transportation of expensive cargos such as drilling crews and specialists and urgently-needed supplies and repair parts. Each offshore drilling rig is a multi-million dollar undertaking which operates around the clock and time lost is valued at thousands of dollars per hour.

To make a supply flight to a rig 60 miles off the shore, considering winds, profitable payloads and safety factors, an S-55 is limited to only 4 passengers whereas 6 or more are carried normally. This handicap will be overcome by the new Sikorsky S-58, which will carry 12 passengers 90 to 100 miles offshore with normal safety considerations.

With more drilling rigs going farther from shore, continued expansion of commercial helicopter operations in this area is expected. With the availability of multi-engine machines and the perfection of instrument flying techniques which will accompany the multi-engine development, Petroleum Helicopters can be expected to double its current operations. The larger helicopters of the future, especially of the flying crane variety, will also accommodate larger cargos and this will lead to an expansion of flying activities.

Although Petroleum Helicopters appears to be the largest commercial operator in the volume of revenue flying performed, Okanagan Helicopters of Vancouver is the largest in the number of helicopters operated. This enterprising firm, which specializes in difficult operations of the Far North such as supplying the DEW Line radar defense chain and huge construction projects, operates a fleet of 34 machines and recently became the first commercial firm to buy a large Sikorsky S-58. With two companies, Okanagan has accumulated a total of more than 43,000 revenue hours.

A West Coast operator, Jim Rickleffs, who owns three companies, has amassed some 50,000 flight hours and Economy Pest Control of Yakima, Washington, a single company, had flown some 22,000 hours through 1955. Economy probably is the largest firm specializing in agricultural flying, having logged some 14,000 hours in this work.

Don Larson of Economy, who serves as secretary of Helicopter Association of America, which is composed of commercial helicopter operators, estimates that some 110 of these helicopter firms have accumulated over 500,000 revenue hours of helicopter operation in the last seven years. One group of 29 operators using 163 machines has amassed a total of 248,230 hours.

Until now, the most successful commercial non-airline helicopter operations have found their richest business in isolated areas where the special characteristics of helicopters offer obvious advantages over all other forms of transportation. But a new field of opportunity was opened recently closer to civilization by Helicopter Air Lift, a new operating company in Chicago. It is headed by John P. (Jock) Henebry of Skymotive at O'Hare International Airport and Hal Connors, who was Henebry's chief for operations when the latter commanded the 315th Air Division in Japan during the Korean War. This firm uses three executive Bell 47's to perform air taxi service for Chicago businesses which are signed up as long-term "subscribers" for varying amounts of helicopter transportation in and about Chicago. There are 24 subscribers now, averaging about 8 per helicopter. Their chief need for occasional helicopter taxi service is keyed to the helicopter's ability to solve surface transportation problems in the big city — a subscriber can move personnel, customers, service experts or cargo clear

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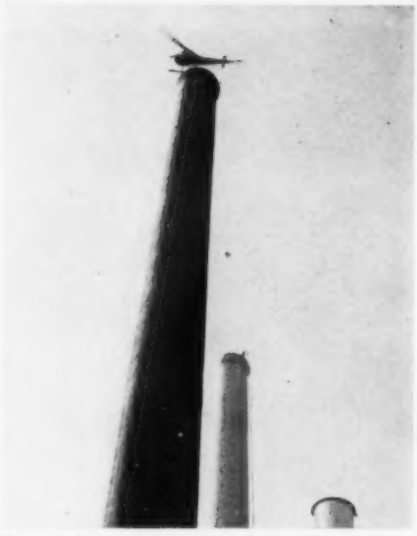


Spectacular jobs are commonplace among commercial helicopter operations. Here's Max Stone of Helix Air Transports, Dallas, caught by the camera as he rested his Bell Model 47 on its skids across the top of a utility smoke stack in Dallas. This was done to unload and attach a block and tackle, from which painters then proceeded to do their work.
—(Bell Photo.)

Okanagan Helicopters of Vancouver operates the world's largest fleet of commercial helicopters, most of them performing difficult tasks in rough, inaccessible Canadian terrain. This photo shows Bill Brooks of Okanagan with a Bell 47 at work on transmission line repair at Kemano-Kitimat. Brooks has made some 13,000 landings and take-offs from 12 by 12-ft. platforms such as this one perched on Canadian crags.
—(Bell Photo.)

SIKORSKY S-58 is now being operated by airlines and commercial firms with crew of two and 12-passenger cabin. It sells for $248,000, is powered by a 1,525-hp. Wright piston engine, has a 5,140-lb. useful load at a gross of 12,700 lbs., carries 198-208 gals. of fuel and cruises at 101 mph. —(Sikorsky Photo.)

Commercial Copter Roundup

FIFTEEN years after Igor Sikorsky's pioneering VS-300 made its first flights, a decade of commercial helicopter manufacturing and operations has passed and 1956-57 developments are setting the stage for rapidly accelerating commercial activities. Bell Aircraft, which obtained the first CAA helicopter certification in 1946, Sikorsky Aircraft and Hiller Helicopters still dominate the helicopter industry but Vertol Aircraft and Doman Helicopters initiated commercial sales this year. A sixth manufacturer, Cessna Aircraft, is delaying commercial marketing until after it is well under way with military deliveries.

SIKORSKY S-56 (above) is still undergoing military development as the first multi-engine transport helicopter, using two P & W R-2800 piston engines rated at 1,900 hp. each. Commercially, it will carry 31 passengers and crew of two beneath its single lifting rotor, which has 5 blades. It has carried 13,250 lbs. to 7,000 ft. and has flown at 162.7 mph., both new records. Over 1,000 Sikorsky S-55's (below) have now been produced and are widely used by military forces, airlines and commercial operators. Ten-place S-55, with 600-hp. piston engine, has 2,405-lb. useful load at 7,200-lb. gross weight, carries 185 gals. of fuel and cruises 86 mph. It is priced at $147,500. —(Sikorsky Photos.)

Commercial helicopters now available, listed in the convenient table on the opposite page, include four 3-place utility models priced from $41,500 to $49,500; one 4-place model at $63,750; one 8-place model at $120,000; a 10-place model at $147,000; a 12-14-place model at $248,000 and an 18-21-place model at $275,000.

All are single-engine aircraft, with engines ranging from 200 to 1,525 hp. But current military modification projects are converting the two largest helicopters, of which commercial versions are available, into twin-turbine configurations which will make engine-out operations practical for the first time. These are the 12-14-place Sikorsky S-58 and the 18-21-place Vertol H-21 and the experimental turbine installations will fit two 1,000-hp. General Electric shaft turbines at less engine weight than they now carry with single piston-power plants. While there will be significant gains in performance, such as increased speed and payload, the major consideration is the attainment of multi-engine reliability for increased safety, utilization and night and instrument flying developments.

Both projects probably will demonstrate their success during 1957 and kit installations for existing commercial machines may become available in 1958.

Until then, current models will carry the industry's work load and Sikorsky leads with its widely-operated

10-12-place S-55 and 12-14-place light transport S-58. This pioneering firm has produced more than 2,000 helicopters in the last 15 years, most of them military deliveries including more than 1,000 S-55's and 400 of the big S-58 type which is probably the finest Sikorsky of them all. It went on the commercial market only recently, with 16 orders for immediate delivery to airlines and other non-military purchasers. The firm's biggest potential, however, is represented by its new twin-engine military S-56, powered by two P & W R-2800 piston engines derated to 1,900 hp. each. This husky will carry 33 persons commercially when it becomes available and will be the first true helicopter airliner. It has already carried more than 13,000 lbs. to an altitude of 7,000 ft. for a new world's record and has just set a new helicopter speed record of 162.7 mph. Sikorsky presently employs over 10,000 persons in plants at Stratford and Bridgeport, Conn.

Commercial users of Sikorsky helicopters, with the number and model of machines they operate, currently include New York Airways with 3 S-58's and 5 S-55's; Los Angeles Airways with 5 S-55's; Chicago Helicopter Airways with 3 S-55's; Sabena Belgian Airlines, which is replacing its 9 S-55's with S-58's, having received 5 of the larger ships (Sabena's S-55's have been sold to the French); Osterman's of Sweden, 1 S-55; Humble Oil, Houston, 6 S-55's; Petroleum Helicopters, Lafayette and New Orleans, 5 S-55's and 1 S-58; California Co., Louisiana oil fields, 4 S-55's; Hudson's Bay Co., 1 S-55; Okanagan Helicopters, Vancouver, 1 S-58 and 5 S-55's; Sperry Gyroscope, 1 S-55; Continental Oil, Houston, 2 S-55's; Grumman Aircraft, 1 S-55.

Vertol Aircraft Corp., Morton, Pa., entered the export market and began commercial sales in 1956, with Harry S. Pack, vice president-customer relations, announcing sales representative appointments throughout Western Europe, in two South American countries and Japan, as follows: BELGIUM — Aerobel, Brussels; DENMARK — Mogens Harttung, Copenhagen; FRANCE — Helicop-Air, Paris; GERMANY — Finanz-und Verwaltungs-Gesellshaft, Bremen; NETHERLANDS — Schreiner & Co., The Hague; NORWAY — H. H. Broch, Oslo; SPAIN-PORTUGAL — Carlos Cudell Goetz, Lisbon; SWEDEN — Salen & Wicander, Stockholm; SWITZERLAND — Air-Import Corp., Lucerne; UNITED KINGDOM — Rotorwings, London; PERU — Ingenieria Comercial, Lima; VENEZUELA — Servicios Circa, Caracas, and JAPAN — C. Itoh & Co., Tokyo.

Several hundred Vertol H-21's are now with military services in Europe and America and the first of 100 of the machines ordered by the French government are operating in Algeria. Vertol has opened a European service office in Paris in charge of A. V. Tuccillo and has appointed three maintenance, overhaul and repair licensees —two in Europe and one in the Far East.

Joint CAA-Canadian certification of the commercial Model 43 version of the H-21 will be completed in time for commercial deliveries early in 1957. It will gross 14,000 lbs. as compared to 13,300 lbs. for the H-21, and will carry 16 to 19 passengers with a crew of 2. Price of the Model 43, powered by a 1,425-hp. Wright 1820-103 engine, ranges from $275,000 to $300,000 depending on equipment installations.

Vertol's twin-turbine H-21D, being developed under a joint Navy-Army

CURRENT PRODUCTION COMMERCIAL HELICOPTERS AT A GLANCE

Factory Data as of December 1, 1956

Make and Model	No. Places	Hp.	Gr., Wt., Lbs.	Useful Ld., Lbs.	Fuel, Gals.	Cr. Spd. Mph.	Price
Bell 47G	3	200	2,350	915	43	81	$ 41,500
Bell 47G-2	3	200*	2,450	886	43	89	$ 44,500
Bell 47H-1	3	200	2,350	847	35	92	$ 49,500†
Bell 47J	4	220*	2,565	1,027	35	95	$ 63,750
Cessna CH-1	2-4	260‡	3,000	1,025	60	100-120	NA
Doman LZ-5	8	400	5,200	1,950	117	80	$120,000
Hiller 12C	3	200	2,500	858	28	71	$ 47,750
Sikorsky S-55	10	600	7,200	2,405	185	86	$147,500
Sikorsky S-58	12-14	1,525	12,700	5,140	198-208	101	$248,000
Vertol 43	18-21	1,425	14,000	5,200	300	100	$275,000

NOTES: *Derated Lycoming. †Includes custom deluxe interior. ‡Net hp. to transmission. All machines listed are single-engine. All are single-rotor, except Vertol, which is tandem. Kaman K-600 is now available to friendly foreign governments but no price has been quoted. It has 5 places, 600 hp., 6,800-lb. gross weight, 2,760-lb. useful load, 66-gal. fuel supply, 75-mph. cruising speed and twin intermeshing rotors.

Vertol H-21 is pictured here in three types of operation. Commercial Model 43 version at $275,000-$300,000 will offer 1,425-hp. Wright engine, seating for 16-19 passengers, 14,000-lb. gross, 5,200-lb. useful load, 300 gals. of fuel and 100-mph. cruise. Hundreds of military H-21's have proved the design's capabilities under worldwide conditions.
—(Vertol Photos.)

DOMAN LZ-5-2 is shown above transporting an automobile to demonstrate its large cabin doors. Army YH-31 version is shown below. Doman seats 6 with crew of 2, is powered by a 400-hp. Lycoming flat engine in the nose, grosses 5,200 lbs. with 1,950-lb. useful load, has 117-gal. fuel capacity with 80-mph. cruising speed, and is priced at $120,000.
—(Doman Photos.)

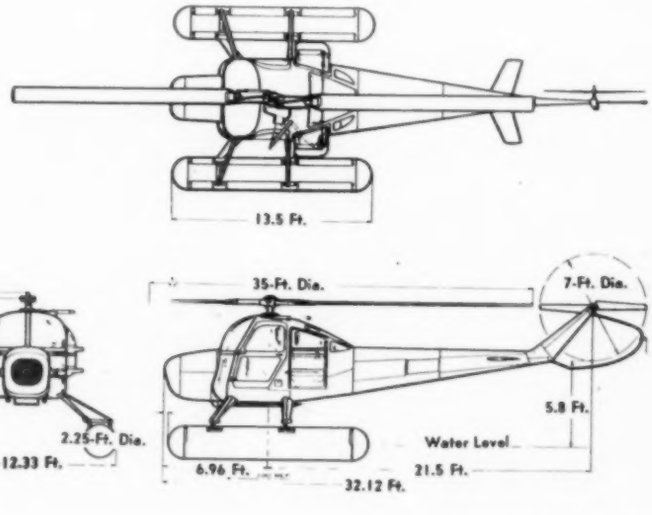
contract with two 1,000-hp. GE turbines, will be certificated commercially as a follow-on to the Model 43. Two H-21C's are receiving the turbines, which will boost payload by over 40% and cruising speed by 50 mph., so that the H-21's ton-mile-per-hour capability will be more than doubled, hovering ceiling will be increased and multi-engine reliability will be achieved. Seating slightly less than the DC-3, it may do for helicopter operators what the DC-3 did for the airlines — provide the first economical transport in this category.

Doman Helicopters at Danbury, Conn., had its 8-place, 400-hp. LZ-5 certificated by CAA and its first military YH-31 version recently completed U. S. Army user test evaluation at Ft. Rucker, where a second YH-31 was to be delivered before the end of the year. Some 150 hrs. of flying comprised the test, the machine averaging 3.6 hrs. daily with 15 hrs. maximum for a single day. Its commercial LZ-5 version was shipped to Europe and has completed a French Air Ministry flight test evaluation, sponsored by Generale Aeronautique Marcel Dassault, builders of Super Mystere jet fighters. The U. S. quoted commercial price is $120,000 for the LZ-5, with 400-hp. Lycoming SO-580 8-cylinder engine, 5,200-lb. gross weight, 1,950-lb. useful load and 117-gal. fuel capacity. Doman has a trimotor anti-submarine warfare helicopter design in a Canadian competition but has released no details.

Cessna Aircraft Company at Wichita, Kansas, is improving and refining its Army-ordered YH-41 2-4-place utility helicopter, of which there is a CAA-certificated CH-1A version which will be marketed commercially in 1958 only after initial military production. Chief improvement is replacement of the 6-cylinder supercharged Continental FSO-470 engine, which delivered 260 hp. net to the transmission, with the new 6-cylinder supercharged Continental FSO-526 which will be rated to deliver 270 hp. or more to the transmission. This is the considerably improved and beefed-up engine which Continental developed for Cessna's 4-engine, pressurized Model 620 business transport, on which it is rated at 350 hp. and probably will be boosted to 400 hp. The helicopter version is rated to deliver 270 hp. to the transmission up to an altitude of 10,000 ft. Belt drives which were used on the prototype XH-41 are being replaced with gear drive. All performance and loadings will remain unchanged, it is said.

The Cessna helicopter has a transmission designed for 3,000 hrs. between overhaul periods and a rotor head assembly designed for more than 1,000 hrs. between overhauls. The prototype now has more than 900 hrs.

CESSNA YH-41 2-4-place utility helicopter's airplane-type panel is pictured above, with the drawings at right giving dimensions and showing its float, litter doors and hoist provisions. It has nose-installed 6-cylinder Continental FSO-526 supercharged engine derated to 270 hp. to the transmission. Standard CH-1 Cessna has 1,025-lb. useful load at 3,000-lb. gross weight, 60 gals. of fuel and 100-120-mph. cruising speed. It probably will sell in the $65,000 bracket in 1958.
—(Cessna Photo and Drawing.)



without overhaul and its engine now has exceeded 550 hrs.

In addition to a field-test quantity of YH-41's for the Army, Cessna will deliver two of the machines to the Navy for engineering evaluation.

Hiller Helicopters has 48 worldwide distributors and dealers for its $47,750 3-place, 200-hp. Model 12-C utility helicopter. This year Hiller has made available for it a McCulloch supercharge which gives sea level performance up to about 7,000 ft. The supercharger is available factory-installed at $3,820 and in kit form for field installation at $3,335. It adds some 55 lbs. to the 12-C's empty weight of 1,640 lbs., leaving a useful load of about 800 lbs. at a 2,500-lb. gross.

Bell Aircraft still holds the distinction of selling more commercial helicopters than any manufacturer in the world, its basic Model 47, produced in several variations, being the standard among utility machines. Well over 500 commercial Bells are now in operation. In 1956, Bell's commercial deliveries will top 115 units as compared to 84 delivered in 1955, according to Commercial Sales Manager J. Cully Weadock. Among the 1956 deliveries have been some 75 Model 47G-2's and 20 each of the Model 47G and Model 47H-1.

The 47G is powered by a 200-hp. Franklin Aircooled Motors 6V4-200-C32 engine, has a 915-lb. useful load at 2,350-lb. gross, and sells for $41,500 as the lowest price production helicopter on the market. The 47G-2, with a 250-hp. Lycoming VO-435 engine derated to 200 hp., has an 886-lb. useful load at a 2,450-lb. gross and sells for $44,500. Its ceiling is 15,700 ft. as compared to 8,600 ft. for the G. The 47H-1, at $49,500, is Bell's custom deluxe executive 3-place machine and has an 847-lb. useful load with the 200-hp. Franklin.

A fourth commercial version of the Model 47 is the new 4-place J version, for which first deliveries are scheduled to be made at the end of 1956 and in January, 1957. Some 15 47J's will go out in the first deliveries and orders on hand call for a steadily-increasing production for 1957.

As the first commercial 4-place helicopter on the market, the J has been demonstrated only briefly but has produced orders at a faster rate than any other helicopter. It has a 250-hp. Lycoming VO-435 derated to 220 hp., a ceiling well over 15,000 ft., a cruising speed of more than 105 mph., and a useful load of 1,027 lbs. at a 2,565-lb. gross weight. It also features a new all-metal rotor blade of 37-ft.-2-in. diameter and numerous accessories for executive flying or workhorse operation, including plush interiors, electric hoist, floats, litters and long-range fuel system. Basic price now quoted for the 4-place J is $63,750.

BELL MODEL 47J is the first 4-place utility helicopter on the commercial market and deliveries begin late in December or early in January, with more than 15 units going out immediately. It is shown here with floats. With a 250-hp. Lycoming derated to 220 hp. it has a 1,027-lb. useful load and a ceiling above 15,000 ft. The $63,750 Model 47J has been named the "Bell Ranger" and tops Bell's line of four commercial versions of the basic Model 47, over 500 units of which are now in commercial operation. —(Bell Photo.)

BUSINESS FOR OPERATORS

(Continued from page 35)

across the city with a saving of as much as three hours in travel time.

This big city taxi role for helicopters depends on several factors for success. First is energetic, thorough sales work. Others include public cooperation, availability of numerous and strategic heliports, and operational standards recognizing safety considerations above everything else. Helicopter Air Lift has all four factors working in its favor — and it is rapidly proving itself as one of the industry's brightest successes.

Currently, North American commercial helicopter operators include the following as listed alphabetically:

Aero-Copters, Inc., Seattle; Aetna Helicopter Service, Fort Jones, Calif.; A-F Helicopters, Inc., San Fernando, Calif.; Alaska Helicopters, Inc., Anchorage; Allied Helicopter Service, Inc., Tulsa, Okla.; American Helicopter Co., Santa Barbara, Calif.; Anaconda Copper Mining Co., Grants, N. M.; Associated Helicopters, Ltd., Edmonton, Canada.

Bell Aircraft Supply Corp., Glendale, Calif.; Bradford, Laws and Weatherby, Hollister, Calif.

The California Co., New Orleans; Cal Rotors, Pasadena; Canadian Helicopters, Ltd., Toronto, Canada; Chicago Seaplane Base, Inc., Lombard, Ill.; Chicago Helicopter Airways, Chicago; Cleveland Air Taxi, Inc., Cleveland; Colorado Interstate Gas Co., Colorado Springs; Continental Copters, Inc., Dallas; Currey Flying Service, Galesburg, Ill.; Continental Oil, Houston.

Arthur V. Davis, Miami; Dominion Helicopters, Toronto; Dean Johnson, Inc., McMinnville, Ore.; Doman Helicopters, Danbury, Conn.; Douglas Aircraft Co., Santa Monica, Calif.

Economy Pest Control, Yakima, Wash.; Empire Helicopter Corp., Fort Morgan, Colo.

Fresno Helicopters, Fresno, Calif.; Edward B. Foster, Manhattan Beach, Calif.; Fastener Corp., Chicago; Fruehauf Trailers, Detroit.

General Air Transport, Kenner, La.; Glasscock Drilling Co., Corpus Christi, Tex.; Robert W. Galvin, Chicago; Grumman Aircraft, Bethpage, N. Y.; Peter Gring, Burley, Idaho.

H-S Copters, Inc., Anchorage, Alaska; Hawk Helicopters, Ft. Worth and Corpus Christi, Tex.; Helicopter Air Lift, Chicago; Helicopter Aircraft Service, Weedsport, N. Y.; Helicopter Service & Sales, Inc., Seattle; Helicopters, Inc., Denver; Helicopter Utilities, Inc., White Plains, N. Y.; Helix Air Transports, Dallas; Hiller Helicopters, Palo Alto, Calif.; Hiller Helicopter Sales, Chicago; Humble Oil Co., Houston; Hudson's Bay Co.; Hunt Brothers Circus, Burlington, N. J.; Hydro-Electric Power Commission, Toronto.

Johnson Flying Service, Missoula, Mont.

Kern Copters, Inc., Bakersfield, Calif.; Keystone Helicopter Corp., Philadelphia; L. N. Koutnik, Manitowoc, Wis.

LaMesa Helicopter Service, LaMesa, Calif.; Leavens Brothers, Ltd., Toronto; Lewis Aircraft Sales & Service, Lockport, Ill.; Los Angeles Airways, Los Angeles; Charles V. Litton, Grass

HILLER MODEL 12-C now has a McCulloch supercharger available as optional equipment. It is said to provide sea level performance of the 200-hp. Franklin engine up to about 7,000 ft. Supercharger weighs 55 lbs., is priced at $3,820 factory installed or $3,335 in kit form. Without supercharger, the 3-place 12-C has an 858-lb. useful load at a 2,500-lb. gross, 28 gals. of fuel and 71-mph. cruise. It sells for $47,750. Below are pictured Hiller H-32 ram-jet 2-pl. helicopters delivered recently to the Army. The H-32 is powered by two tip-mounted Hiller 8RJ2B engines of 40 lbs. of thrust each. These little engines weigh only 12 lbs. each but consume 1 gal. of fuel per min. each. Fuel capacity of 50 gals is sufficient for only 26-mi. range. At 1,080-lb. gross weight, useful load is 536 lbs. Rotor blade diameter is 23 ft. Cruising speed is 60 mph., rate of climb 680 fpm., and service ceiling 6,900 ft. The Army is getting 12 and the Navy 3 H-32's.
(Hiller Photos.)

HILLER TRI-MOTOR FLYING PLATFORM, of which a model is shown above, will be powered by three 44-hp., 2-cycle piston engines. It uses ducted fan principle of lift and the pilot body balance is used for directional control. Hiller is building two tri-motors under a $500,831 Army contract. The first single-engine Hiller Flying Platform first flew in 1955.
(Hiller Photo.)

Valley, Calif.

Magnolia Petroleum Co., Dallas; Miller Aviation Center, Dravosburg, Pa.; Murray Petroleum, San Angelo, Tex.; Mountain Helicopters, La Canada, Calif.

New England Helicopter Service, Hillsgrove, R. I.; A. L. Newman, Kelseyville, Calif.; New York Airways, New York; New York Trap Rock Corp., New York; Northern Wings Helicopters, Sillery, Canada.

Ohio Valley Airways, Inc., Cincinnati; Okanagan Helicopters, Ltd., Vancouver.

Pacific Helicopter Service, Santa Monica, Calif.; Petroleum Helicopters, Lafayette-New Orleans, La.; Pacific Western Airlines, Vancouver; Pacific Helicopters, Oakland; Pipe Line Construction & Drilling Co., Camp Hill, Pa.; Allen K. Platt, Chelan, Wash.; Port of New York Authority, New York.

Radio Materials Corp., Chicago; Jack Reynolds, Candor, N. C.; J. D. Reed, Houston; Rick Helicopters, San Francisco; Roger Sherman Transfer Co., East Hartford, Conn.; Rotor Aids, Ventura, Calif.; W. Lynn Roberts, Boise, Idaho.

Southern Air Transport, Miami; Southwest Helicopters, Van Nuys, Calif.; Smith-Van Every-Gardner, Grants Pass, Ore.; Spartan Air Services, Ltd., Ottawa, Canada; Sikorsky Aircraft, Bridgeport, Conn.; Stockton Helicopters, Stockton, Calif.; Suburban Propane Gas, Whippany, N. J.; Stewart Air Service, Hawthorne, Calif.; Sperry Gyroscope, New York; Skymotive, Chicago; J. C. Sproule, Calgary, Canada.

Tennessee Valley Authority, Wilson Dam, Ala.

United Helicopters, Ltd., St. Johns, Newfoundland; United Manufacturing Co., Chicago; U. S. Helicopter Service, San Francisco.

Vancouver Island Helicopters, Sidney, B. C.

W. T. Waggoner Estate, Vernon, Texas; Wiggins Airways, Norwood, Mass.; World Wide Helicopters, San Fernando, Calif.; Western Helicopters, Compton, Calif.; Western Helicopter Ltd., Toronto; Whirl-Air, Detroit.

New Copter School

ALLIED Helicopter Service, Inc. Brown Airport, Tulsa, Oklahoma, now offers helicopter flight training for commercial pilots who desire a helicopter rating. Roy B. David, president, says he is conducting the school on an individual student basis permitting students to begin training at any time. The course takes approximately 10 days to complete — no written examination is required and the necessary ground instruction is given in conjunction with the flight training.

TURBINE HELICOPTERS

(Continued from page 31)

bines will compare favorably in overall diameter as complete power packages. They will also compare favorably in specific fuel consumption, which probably will turn out to be between .6 and .7 lb. of fuel per hp. hour.

Whereas the GE T-58 is an axial-flow engine all the way, which makes for extremely close tolerances and small, jewel-like blades, the Lycoming T-53 combines axial with centrifugal design so that it is less critical. In a helicopter, whose blades churn large amounts of dust, dirt and debris, the need for a high degree of intake air filtering will be pressing, especially for the GE. It appears probable that the GE turbine will prove to be a "race-car" type of power plant while the Lycoming will be a "work-car" or truck-type of turbine. ★ ★ ★

Proposed Heliport Standards

By HARRY BERNARD
Civil Aeronautics Administration,
Region One, New York

THE CAA, as a federal agency, does not license heliports. The legislative authorization in this respect is precisely as it is for airports. The control of landing areas through licensing is properly a state or local municipality, and not a federal function. The only authority exercised by the CAA in heliport matters involves passing on the relative safety of particular heliport sites where scheduled air carrier operation is involved. Even in these cases, we do not approve or disapprove heliport sites per se, but merely pass on the acceptability of the site for scheduled air carrier use.

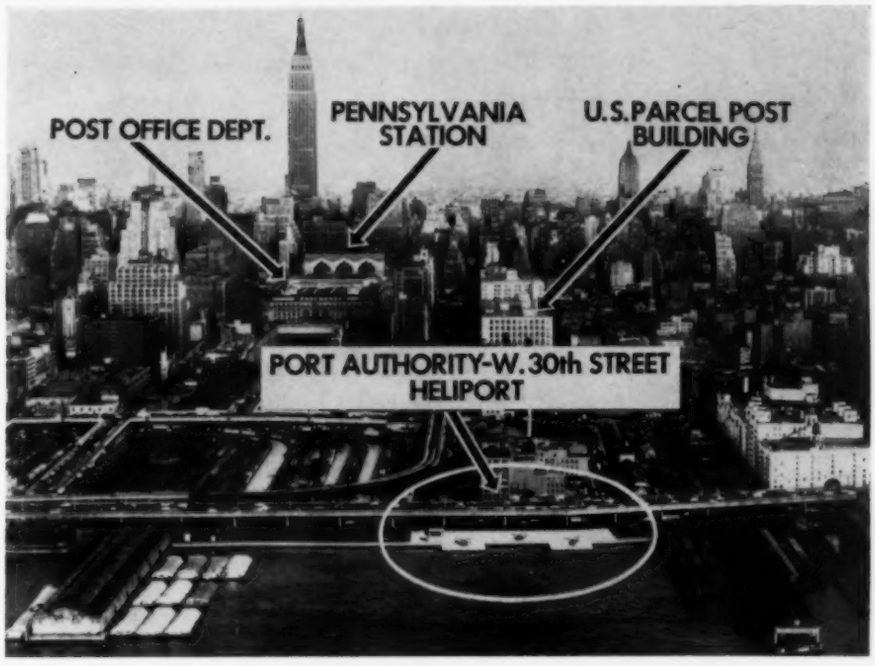
Even though there is no legislative authority for federal licensing, CAA is often called upon to provide advice and assistance for the selection and building of landing areas. It has already been determined that heliports are eligible for federal airport funds. Many smaller communities where terrain or lack of funds preclude the establishment of an airport are apparently determined to get on the air map, and perhaps fill a need for helicopter service.

Many organizations and committees have been seeking to develop location and design criteria acceptable to all parties. To date, however, no such criteria has been developed. The CAA now feels that enough operational experience has been gained to prepare a heliport criteria which will soon be coordinated with all interested parties in the industry before adoption. I would like to underline that this proposed criteria, based on sound operational experience, is merely a proposal at this time and not an established criteria.

Governing Factors

If a heliport site is to be chosen with wisdom, it must meet two basic requirements. One, it must be close to traffic generating areas and, two, it must be located with full knowledge of the operational characteristics and limitations of the helicopter.

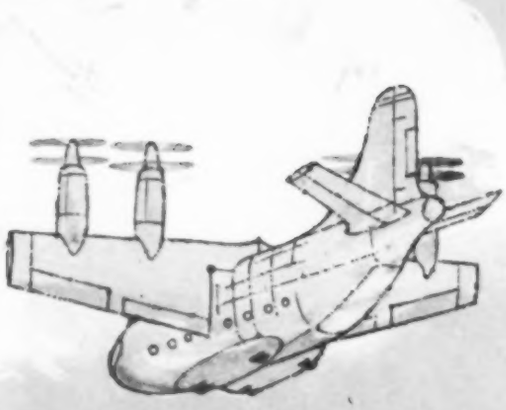
Heliport site selection based on traffic generating potential must be made on the basis of site costs, public nuisance factor, including noise sensitivity, its accessibility to the Post Office and accessibility to surface traffic, among others. These are all factors bearing on site selection. Unfortunately, the ideal spot for a heliport in a large city is usually at a place where real estate is costly and already developed. However, in order to realize full utilization, the heliport will have to be located in downtown areas. Fortunately, most of the larger cities are built on bodies of water and these bodies of water in themselves may provide the necessary access and egress paths for the helicopter.

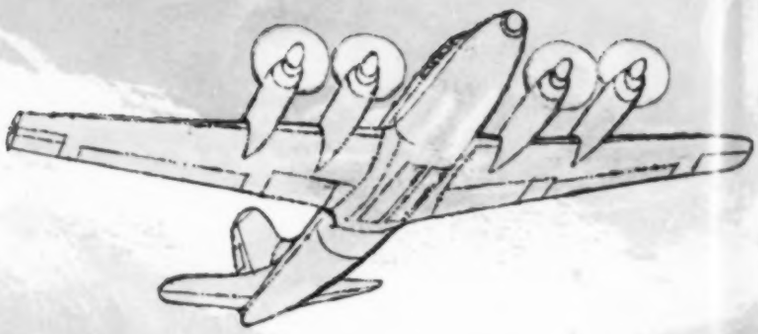


New York's commercial heliport for Manhattan's business district was recently opened as the Port Authority's West 30th Street Heliport and is shown above. Costing $320,000, it includes a 70 by 400-ft. strip of land along the bulkhead as well as the water area between the bulkhead and the U. S. Pierhead Line, about 500 ft. offshore. It comprises two 80 by 80-ft. touchdown pads, a helicopter parking area 50 by 50 ft. between them, and a 20 by 40-ft. terminal building. New York Airways is using it for scheduled operations. An artist's sketch below depicts how it will be enlarged for large helicopters of the future, with a 200 by 400-ft. landing area. By next spring, the existing heliport will be served by 20 daily flights of N. Y. Airways 12-passenger helicopters. The enlarged heliport will cost $5,000,000 and will handle up to six large transports at a time. The Port Authority says it will be built as soon as traffic requires it. The site is only 15 mins. from Idlewild Airport, 10 mins. from Newark Airport and 8 mins. from LaGuardia Airport by S-58 helicopter.
—(N. Y. Port Authority Photos.)

The second and perhaps most important governing factor is the operational limitations of present helicopters. In this regard, the helicopter has very greatly been oversold, at least to the layman. It is popularly believed that a helicopter can take-off and land vertically, requiring very little room. Of course, mechanically it can do this. However, if it is to carry its full commercial load safely, it must climb and descend with enough forward speed to provide sufficient rotor inertia to make a safe auto-rotational landing in the event of power failure, about 40-60 knots for present helicopters. This means that flight paths will be comparable to fixed-wing flight paths, except they will be much steeper. This ability to make safe auto-rotational

(Continued on page 60)





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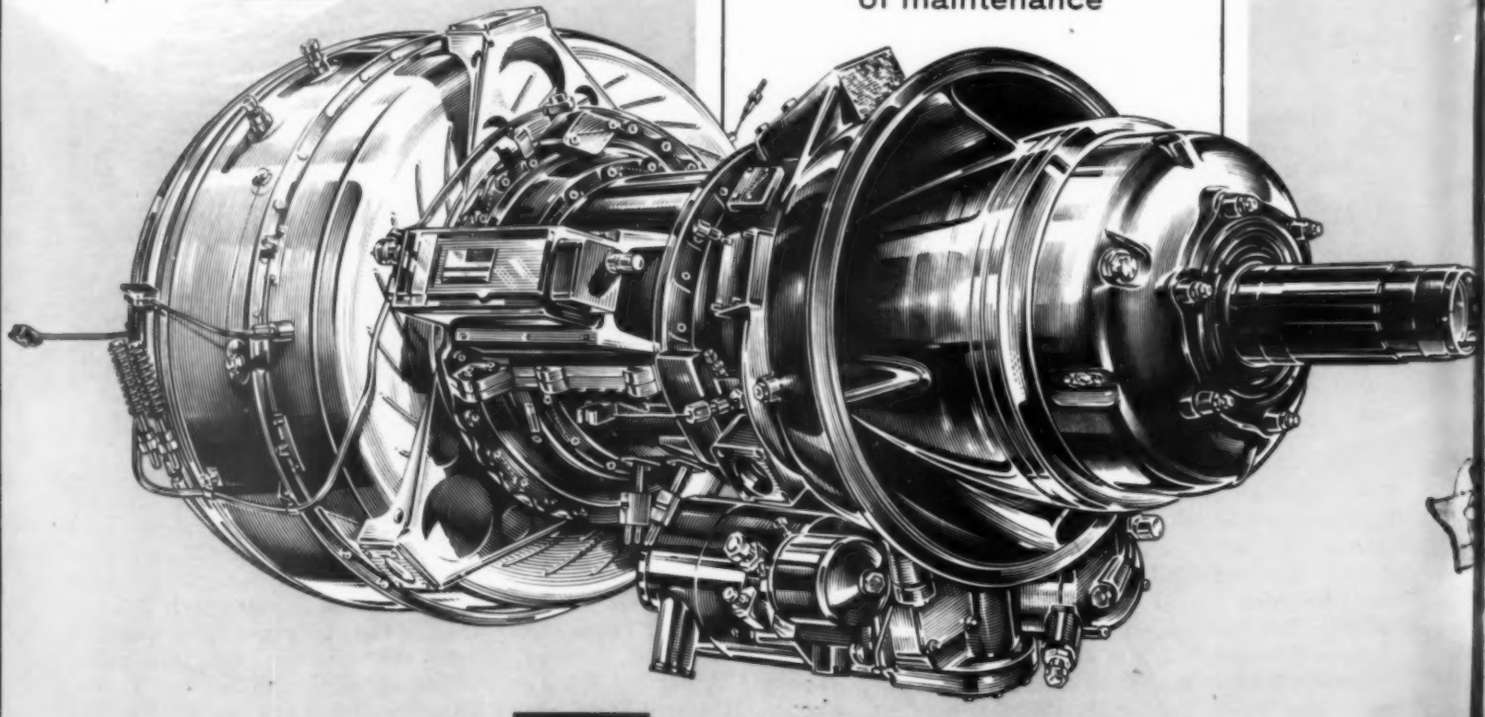

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Ready to take to the air, the complete turbo-prop weighs only 460 lbs. and delivers 960 h.p. from a compact 47.6 length x 23-in. diameter. Using a variety of fuels including automotive and aviation types, gasoline and JP-4, it operates at a low 0.655 lbs. per e.s.h.p. per hr. consumption. Rugged design features and unprecedented ease of maintenance guarantee safe operation and long life.

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To learn more about the T-53 and Lycoming's ample facilities to produce it, phone, wire or write for turbine information to Avco Lycoming, Stratford, Conn.

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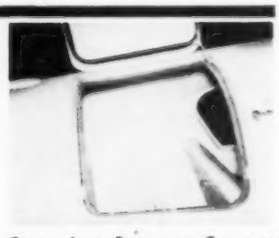

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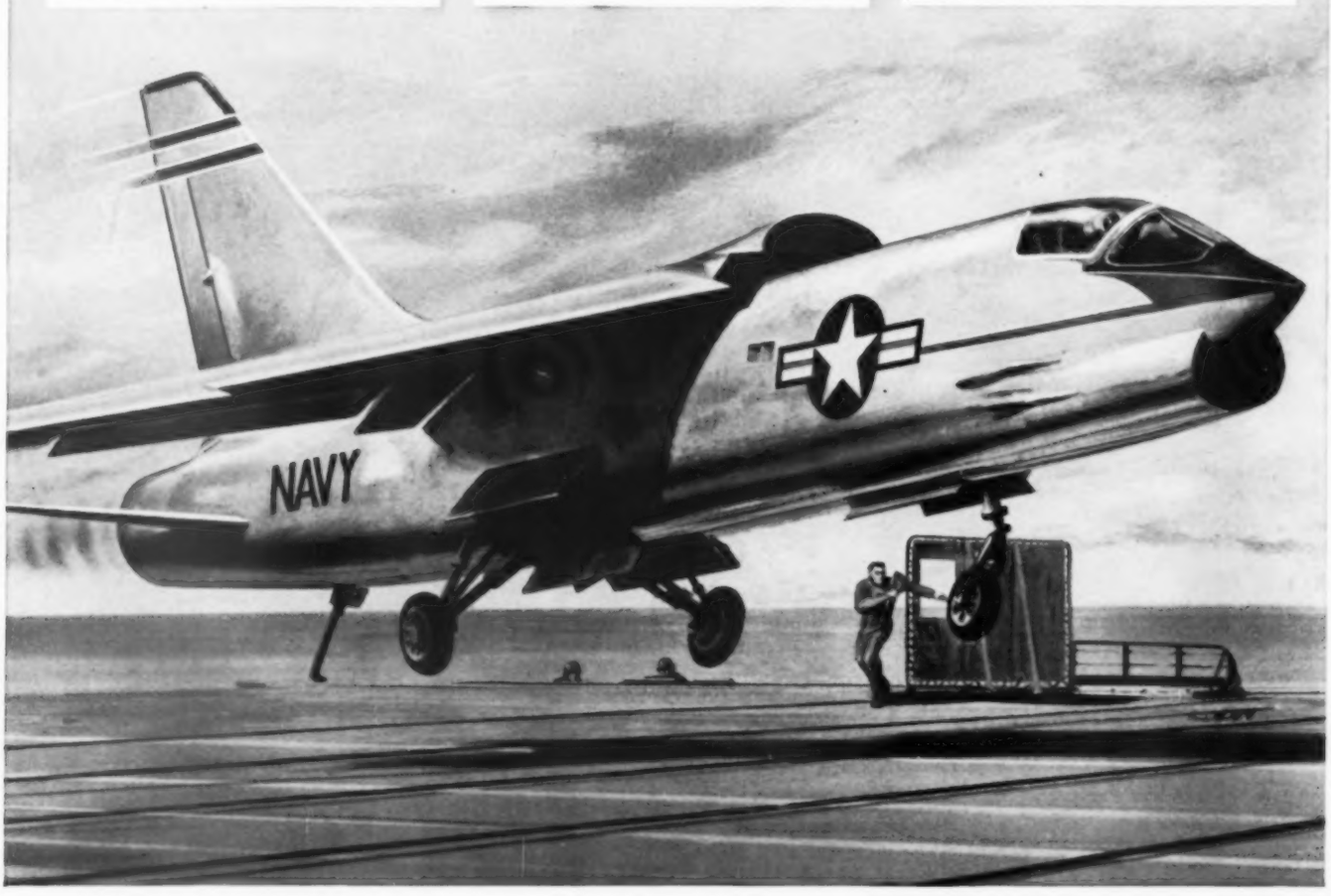

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NAVY FLIGHT SETS NEW RECORD

Allison Turbo-Prop-powered "Tradewind" opens new era in vital Pacific Fleet service

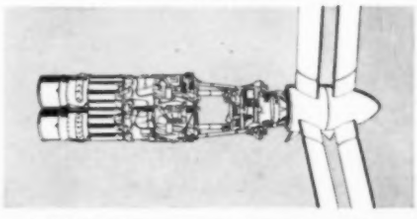
A few weeks ago the U.S. Navy opened a new chapter in aviation history when its giant aerial tanker – the Convair R3Y-1 Tradewind – set a new trans-pacific speed record for water-based aircraft. On its maiden round-trip flight from Alameda, California, to Keehi Lagoon, Honolulu, Air Transport Squadron TWO [VR-2] firmly established the Navy's long-standing belief in turbo-prop power as the jet age's most flexible and efficient power source. On its return flight the Tradewind covered the nearly 2,500 miles over water span in 6¾ hours, far surpassing the record on this route for this type aircraft.

Powered by four Allison twin power section turbo-prop engines driving contrarotating Aeroproducts Propellers, the Tradewind boasts nearly 24,000 horsepower–can lift its 80-ton weight from the water in 30 seconds, climb quickly to cruising altitude and cover more than 2,000 miles nonstop at speeds in excess of 350 miles per hour.

What makes this astounding aerial feat possible is the development of a whole new concept of powered flight–the culmination of 10 years of research by the Navy, Convair and Allison. It required the solving of one of the most complex engineering challenges in aviation history–perfecting a gas turbine engine of advanced design and mating it with a six-bladed contrarotating propeller.

The R3Y-1 Tradewind will refuel in flight eight jet fighters–*four at a time* –at speeds of more than 350 miles per hour. This new addition to the vast Pacific Fleet, the R3Y-1 will provide a vital service to our fast carrier task forces, further extending the range and striking power of the Navy's mighty air arm.

ALLISON DIVISION OF GENERAL MOTORS CORPORATION
Indianapolis, Indiana



R3Y-1 demonstrates versatility of Turbo-Prop power in jet-age transportation

Record-breaking Navy R3Y-1 is powered by four T40 Allison Turbo-Prop engines like this–each having twin power sections driving contrarotating Aeroproducts Propellers. Both power sections in each engine give the R3Y-1 full power for rapid take-off and climb to cruising altitude. To gain best fuel economy for cruising, one power unit may be shut off entirely, allowing the other to operate at its most efficient setting. Either power section operates all six blades contrarotatively.

ALLISON
TURBO-PROP POWER
VERSATILE POWER FOR JET-AGE FLIGHT

Here's the 1957 version of the 5-place Royal Gull Super 200, featuring supercharged 340-hp. Lycoming pusher engines for outstanding performance as an amphibian. It has a 1,930-lb. useful load at a 6,600-lb. gross weight and is priced at $89,925 by Trecker Aircraft Corp. of Milwaukee and its distributors. —(Trecker Aircraft Photo.)

Supercharged Engines For Royal Gull

TRECKER Aircraft Corporation of Milwaukee is now demonstrating its new Royal Gull Super 200 amphibian for 1957, latest version of the excellent twin-engine 5-place high performance amphibian which originated in Italy.

Now equipped with two supercharged Lycoming engines rated at 340 hp. each for take-off, the 200-mph. Super has remarkable performance including 208-mph. top speed. These engines are the 6-cylinder GSO-480-A1A6 Lycomings which have a maximum continuous rating of 320 hp. each. They are installed high on the gull-winged amphibian as pusher engines, driving Hartzell 3-blade full-feathering constant-speed propellers.

Fully equipped for instrument flying, the Super 200 Gull delivers for $89,925. Trecker calls it the fastest commercial amphibian on the market.

Supercharging has given the Gull extra safety margins, especially for engine-out performance. At gross weight, it has a single-engine service ceiling of 11,800 ft., and will climb to this ceiling at a rate of 276 feet per minute on one engine. These are phenomenal figures for an amphibian having structural integrity for both land and water operations.

Two-engine performance at gross weight includes climbing from sea level to 9,000 ft. in 7 minutes, at a rate of 1,279 feet per minute. It has a service ceiling of 25,500 ft.

Retractable landing gear and its sturdy hull make the Super 200 a versatile aircraft for business travel into seaplane facilities as well as airports on land, and it has outstanding short-field performance both as a landplane and as a seaplane. Take-off distance on land at gross weight and at sea level, using flaps, is 1,440 ft. to clear a 50-ft. obstacle. Water take-off with no wind requires only 14 seconds. Landing distance over a 50-ft. obstacle with full flaps is 1,800 ft.

Gross weight on land is 6,600 lbs. and on water is 6,400 lbs., with a

(Continued on page 75)

Two interesting flight views of the 200-mph. amphibian, showing its spray-free pusher engine installations, with gear and water rudder retracted. Super 200 has 208-mph. top speed at 12,000 ft., 190-mph. cruising speed at 70% hp. and 13,500 ft., and 188-mph. sea level top speed. It will climb from sea level on one engine at a rate of 276 feet per minute to its 11,800-ft. single-engine service ceiling at gross weight. —(Trecker Aircraft Photos.)

New low look has been achieved by Cessna with its 1957 Model 182 from shortening the nosewheel strut and lowering the aircraft's center of gravity. Propeller clearance remains the same. Main wheel struts have been lowered and widened. The 4-place, 230-hp. Model 182 cruises at 155 mph. using 70% power at 8,000 ft. and grosses 2,650 lbs. with a 1,090-lb. useful load. At 155 mph. and 8,000 ft., it has an endurance of 4.2 hours and range of 655 miles with 55 gals. usable fuel. Price this year is $13,975. —(Cessna Photo.)

New And Improved Cessna Model 182

IMPROVEMENTS of more importance than mere styling changes have been incorporated in Cessna Aircraft Company's new 1957 tricycle Model 182 and its tailwheel version Model 180. Along with their introduction in mid-December at open house celebrations staged by distributors and dealers everywhere, the factory has released new and exact performance and specification figures which abandon the customary approximations used in previous years for the popular 4-place, 230-hp. Cessnas.

New 1957 prices are $13,975 for the 182, up $225 over the 1956 version, and $13,250 for the 180, up $300. The 180 price absorbs castering gear, $245 in exchange last year.

Performance pegs include the Model 182's 165-mph. top speed, 155-mph. cruising speed on 70% horsepower at 8,000 ft., 655-mph. range in 4.2 hrs. at 155-mph. cruising speed, 805-mile maximum range in 7.1 hrs. at 114-mph. and at 10,000 ft., and 1,030-fpm. rate of climb.

These figures for the tricycle compare with the following tailwheel Model 180 performance: Top speed 170-mph., 160-mph. cruising speed at 70%

These photos illustrate the new instrument panel and cabin roominess of the 1957 Model 182. Note space for four radios on sub panel without sacrificing glove compartment. New engine cluster has electric fuel gauges for first time. Red light replaces ammeter. Push-pull knob near parking brake drains fuel bowl from cabin. —(Cessna Photos.)

With its impressive power loading of only 11.5 lbs. per horsepower, the new Cessna 182 climbs 1,030 feet per minute from sea level and at gross weight. Steered by rudder on the ground, nosewheel engages a lock when extended in the air to prevent its turning.
—(Cessna Photo.)

hp. at 8,000 ft., 675-mile range in 4.2 hrs. at 160-mph. cruising speed, 845-mile maximum range in 7.1 hrs. at 10,000 ft. and 120-mph. speed, and 1,130-fpm. rate of climb.

The figures for range are based on 55 gals. of usable fuel from the new 1957 total capacity of 65 gals. for both models, as compared to 60-gal. total capacity last year.

Higher service ceilings are claimed for both models this year, being 19,-800 ft. for the Model 182 (as compared to 19,000 ft. last year) and 21,500 ft. for the Model 180 (as compared to 19,800 ft. last year).

Higher gross weights have been given both models for 1957, being 2,650 lbs. as compared to 2,550 lbs. last year for a 100-lb. increase. However, not all of this gain is net, for empty weights have gone up, too. In the 182, the net gain in useful load is 50 lbs., there being a 50-lb. empty weight increase, and the 180 nets only 35 lbs. of the additional 100, there being a 65-lb. empty weight increase. The new figures for useful loads are 1,090 lbs. for the 182 and 1,095 lbs. for the 180, based on the new empty weights of 1,560 lbs. for the 182 and 1,555 lbs. for the 180.

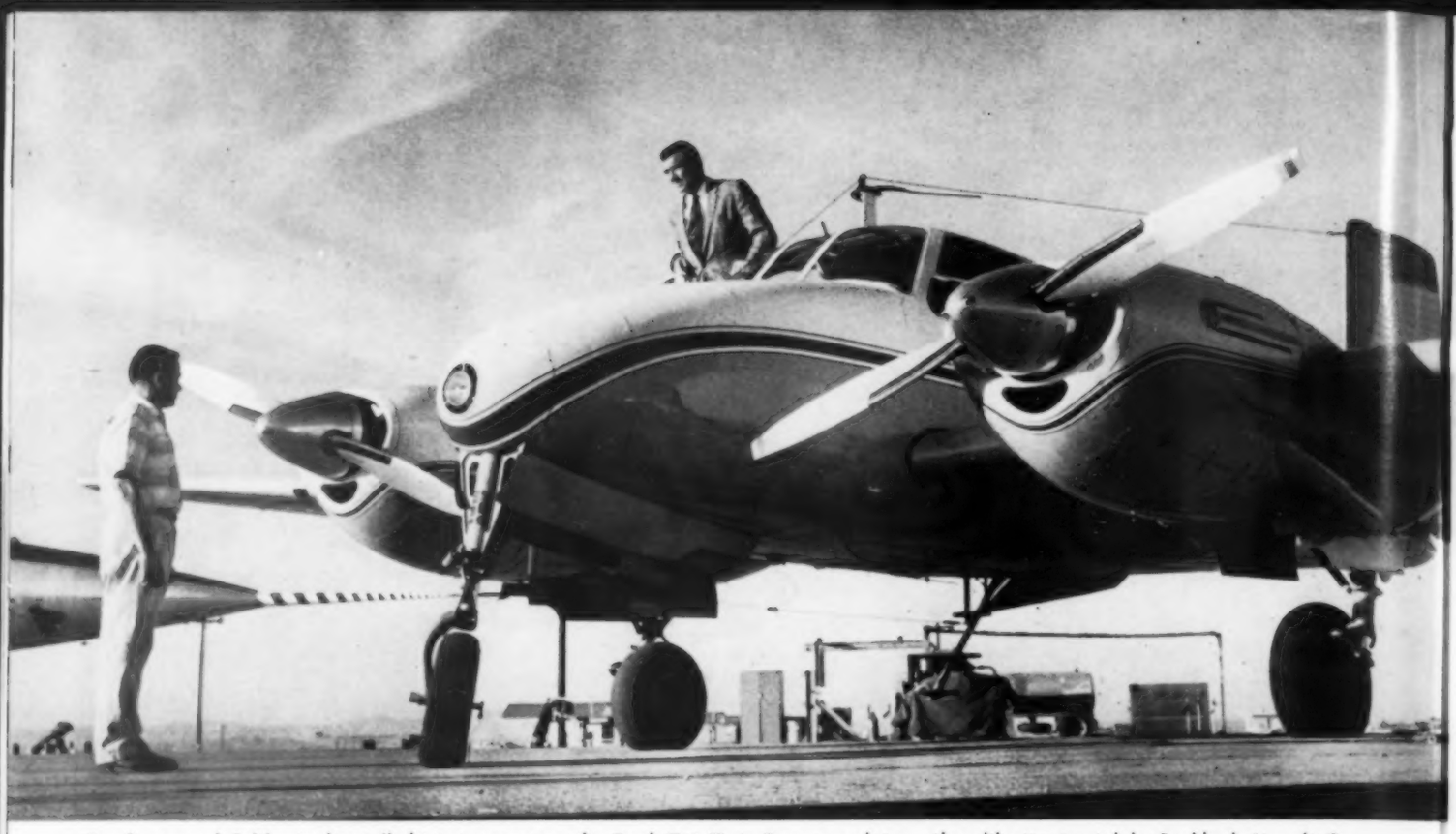
It is interesting to note that the nosewheel accounts for a penalty of only 5 lbs. in the 182 over the empty weight of the 180, while the drag penalty is said to be just 5 mph. in cruising speed, 100 fpm. in rate of climb, 1,700 ft. in service ceiling, 20 miles in range at 70% power at 8,000 ft. and 40 miles in maximum range for a flight duration of 7.1 hours at 10,000 ft.

This is not much of a penalty to pay for all of the utilitarian advantages of the nosewheel airplane and it appears that the 182 will eventually obsolete the tailwheel 180 just as the Cessna 172 did the Model 170. The latter is no longer in production, having given way completely to the more useful tricycle 172. In this connection, it is also interesting to note that the 1957 Model 180 features cross-wind castering wheels as standard equipment, enabling it to retain its usefulness as much as possible in comparison to the 182.

On the 1957 Model 182, ground handling has been improved by short-

(Continued on page 72)

Cessna calls its fixed tricycle gear "Land-O-Matic" because it simplifies landing, take-off and ground handling in comparison with the degree of technique required by the Model 180 with tailwheel. Here the 182 is being landed in level attitude. Nosewheel assures straight roll with minimum or no use of hands or feet on controls, gives greater stability in high or gusting winds and makes for better visibility on the ground.
—(Cessna Photo.)



Familiar around California desert flight test centers are this Beech C50 Twin-Bonanza and two others like it, operated by Lockheed Aircraft Corporation to shuttle its test crews, engineers and technicians to and from its Burbank headquarters. Herman R. (Fish) Salmon, chief engineering test pilot, is shown on the wing before stepping down for a hop in the F-104A fighter nosing into the picture at left.
—(Photo by Erik Miller of Lockheed.)

Test Pilot Report on the Twin-Bonanza

A famous airman describes business plane usefulness to Lockheed

By HERMAN R. (Fish) SALMON
Chief Engineering Test Pilot
Lockheed Aircraft Corporation

FOR a guy who spends much of his time testing hot airplanes, like the ultrasonic F-104, it's a real treat for me to step into one of the company's three Beechcraft Twin-Bonanzas and take off on a routine flight. It's something like a relaxing drive in a Cadillac after zooming around the Indianapolis Speedway in an "Offie."

Not that flying the world's fastest fighter isn't exhilarating. If I didn't enjoy it I'd be running a grocery store or selling cigars. But flight testing can also be a lot of work. Piloting a Twin-Bonanza, on the other hand, is all pleasure — with a capital P!

Why does a big firm like Lockheed by and fly planes built by another aircraft manufacturer?

The reason is simple. We build military jets and large multi-engine passenger transports. Our current production does not include models in the business airplane category. Yet, like many large corporations today, and hundreds of smaller industries and businesses, we have a definite requirement for personal air transportation.

As a result, we turn to the suppliers of this type of specialized flying equipment, just as we would go to the makers of heavy factory machinery if we needed a new drop hammer.

Here's the author, wearing the friendly smile for which he is widely known. Barnstormer, midget racing champion, lightplane enthusiast, and crack bear-shooting marksman who hunts far and wide, Fish Salmon probably has flown faster than any company pilot in the world.
—(Photo by Erik Miller of Lockheed.)

We use the Twin-Bonanza to commute between Burbank and our Palmdale facility and to the Flight Test Center at Edwards Air Force Base where much of the experimental flying is done on Lockheed planes. We use them as air taxis, executive transports, and light cargo carriers.

At one time our fellows either caught airliners (there wasn't one to Edwards or Palmdale), or drove to their destinations. We still travel the airlines on long trips, but we needed our own company planes for other flights. We were eating up valuable man-hours — measured in days — driving back and forth across the mountains and desert.

Lockheed first purchased two single-engine Beechcraft Bonanzas. Later we replaced them with three Beechcraft C50 Twin-Bonanzas, mainly because of the frequent instrument conditions we were encountering and also because of increasing demands for seatroom aboard air transportation to and from

our facilities. We do a lot of moving.

When we bought the four-place Bonanzas, we did so because at the time they were the planes best suited to our particular needs. Likewise, when we switched to twin-engine aircraft we didn't pick a model out of the hat. A board of our pilots appraised all available twin-engine business planes and selected the six-place C50 as best for our needs after four different twins had been put through a series of rigid evaluations.

In addition to excellent flight characteristics, the C50 is clean and easy to work on. Our mechanics like it. But what we were really after were good, safe airplanes for flying VIP's (any person aboard from electronics tech to exec) in local weather, smog, and over mountainous terrain.

We ordered the ships with auxiliary wing fuel tanks, which boosted the gas capacity of each from 134 to 180 gallons and extended normal cruising range to more than 1,400 miles. Other optional equipment included air conditioner for maximum passenger comfort, nose taxi light, Grimes rotating light, and propeller anti-icers.

The radio installation consists of a Lear LVTR-36 36-channel transceiver, ARC T11B 5-channel VHF transmitter, ARC R13B tunable VHF receiver, ARC 15D omni receiver (coupled with R13B receiver), ARC R11LF range receiver, Lear 14B automatic direction finder, and a Flite-Tronic MB-3 marker beacon receiver. The planes are fully instrumented for all-weather flying.

There are many features of the Twin-Bonanza that make this airplane highly acceptable for our purposes. It can carry six persons comfortably and efficiently, at near airline speeds, yet with operating costs only slightly higher than for small, single-engine craft.

Engineers who designed the Twin-Bonanza must have had a pilot in their midst. The plane is comfortable and all the equipment is within easy reach. I really like the layout of the panel — it's a good one. I haven't kept track of the number of instrument letdowns I've made into Lockheed Air Terminal, but I do remember that the panel gives me a little glow of satisfaction every time I'm on instruments.

The 275-hp. Lycoming opposed-six engines seem to be living up to the manual in all respects. Our highest-time aircraft is up to around 600 hours and the engines are running clean and smooth with low oil consumption. We've had no problem with the full-feathering props.

Incidentally, maybe here's a chance to throw in a tip. We've found that when feathering a prop, there's a

(Continued on page 76)

Lockheed formerly used the single-engine 4-place Bonanza for shuttling its flight test crews but went to the Twin-Bonanza because of its 6-place seating, multi-engine dependability, instrument-flying versatility and 200-mph. cruising speed. The author is pictured here preparing to test hop Lockheed's great new long-wing Super Constellation. In the small photo, he is shown in a high-altitude suit with the ultrasonic F-104 fighter.

—(Photos by Erik Miller of Lockheed.)

U. S. Steel has three executive Viscounts and Standard Oil of California has one executive Viscount ready for delivery. Note auxiliary "slipper" tank for fuel, fitted onto wing leading edge adjacent to outboard engine. Two of these tanks add 348 gals. and a belly tank adds 540 gals. to supplement the main fuel supply of 2,310 gals. Total fuel is 3,198 gals. Consumption at 326-mph. cruise is about 300 gals. per hour.
(Vickers-Armstrong Photo.)

First Executive Turbo-props Ready

FIRST turbo-props in United States business flying activity will be new executive versions of the 4-engine Vickers Viscount. U. S. Steel Corporation is in the process of taking delivery of three Viscounts and Standard Oil Company of California has one Viscount coming, all four of the executive turbo-props having been ordered in June, 1955.

The first U. S. Steel Viscount began its pre-delivery flight trials in October at the Vickers factory, Hurn, England. It will be followed by the other three Viscounts in flight delivery across the North Atlantic. These Viscounts are being delivered as "shells," with cabin furnishings and soundproofing being installed in the United States to customer specifications. L. B. Smith Aircraft at Miami, Fla., will perform the custom installations for the U. S. Steel Viscounts.

All four of the American executive versions are being delivered with extra-long-range fuel capacity totalling 3,198 U. S. gals. per aircraft. This is sufficient for a range of over 2,000 miles with reserves. Standard Viscount fuel capacity is 2,310 U. S. gals., to which are added 540 gals. in a belly tank and 348 gals. in two "slipper" tanks fitted externally to the wing leading edge adjacent to the outboard nacelles.

The Vickers price quotation for an executive Viscount without furnishings is $1,050,000 per aircraft. This is with Rolls-Royce Dart R. Da. 6 engines of 1,600 shp. each, with which the recommended cruising speed is 326

(Continued on page 74)

Two more U. S. Steel Viscounts are pictured here in final stages of completion in England. They will be flown to the U. S. for custom interiors by L. B. Smith Aircraft at Miami. Viscount is comparable to twin-engine Convair 440 in size.
—(Vickers-Armstrong Photo.)

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CERTIFIED BEECHCRAFT SERVICE offers many extras to the aircraft owner — extras that do not appear on the service or maintenance bill. But these little extras mean a big saving through the year.

A good example of one of these extras is the CLOSE INSPECTION your airplane receives while it is being serviced on the ramp of a CERTIFIED BEECHCRAFT SERVICE STATION. Trained service personnel will spot — and call to your attention — any mechanism that is not functioning properly thereby eliminating costly repairs later.

CERTIFIED BEECHCRAFT SERVICE technicians, with their long Beechcraft experience and factory training, know your Beechcraft from front to rear. But most important, they take a personal interest — and pride — in seeing to it that your Beechcraft serves you well.

So when your Beechcraft requires service — bring it to one of the CERTIFIED BEECHCRAFT SERVICE STATIONS listed — where it's always *"in good hands."*

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New Municipal Airport
Wichita, Kansas

AIRCRAFTSMEN, INC.
Will Rogers Field
Oklahoma City, Oklahoma

ALAMO AVIATION, INC.
Municipal Airport
San Antonio, Texas

ANDERSON AIR ACTIVITIES
General Mitchell Field, Milwaukee, Wisc.
Truax Field, Madison, Wisc.

ATLANTIC AVIATION CORP.
Teterboro Airport
(25 minutes from Times Square)
Teterboro, New Jersey
Logan Airport, East Boston, Mass.

ATLANTIC AVIATION SERVICE, INC.
New Castle County Airport, Wilmington, Delaware
Philadelphia International Airport, Philadelphia, Pa.

BUTLER CO., AVIATION DIVISION
Municipal Airport, Chicago, Ill.

CURREY SANDERS AIRCRAFT CO., INC.
Downtown Municipal Airport, Shreveport, La.

CUTTER-CARR FLYING SERVICE, INC.
West Mesa Airport, Albuquerque, New Mexico

GRAY AIRCRAFT SVC. CO., INC.
D. A. Cody, Service Manager
Love Field, Dallas, Texas

ELLIOTT FLYING SERVICE
Municipal Airport, Davenport, Iowa

LOPEZ GRACE AVIATION, INC.
Building No. 3 and No. 18
Broward International Airport
Fort Lauderdale, Florida

ROSCOE TURNER AERONAUTICAL CORP.
Municipal Airport, Indianapolis, Ind.

J. D. REED CO., INC.
Municipal Airport, Houston, Texas

TEXAS AVIATION CORPORATION
G. K. Roberts, Pounds Field
Tyler, Texas

TOPEKA AIRCRAFT SALES & SERVICE
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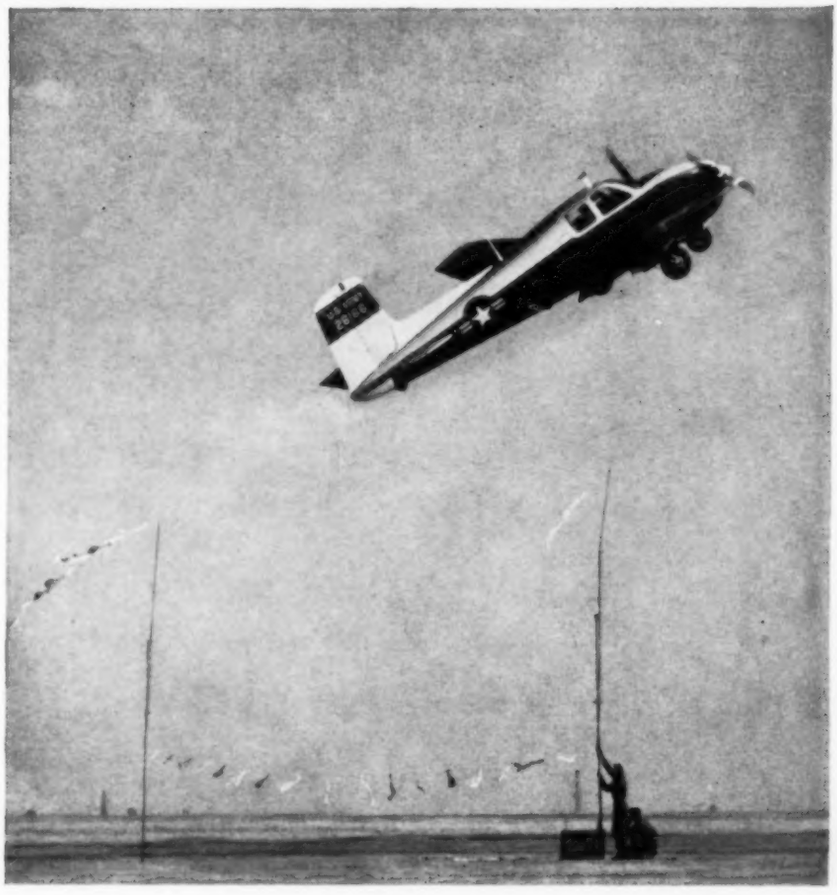
Hangar 8, Municipal Airport, Tulsa, Oklahoma

We work so closely with Beechcraft owners in the maintenance of their airplanes, they have come to regard our service facilities as part of their own operation.

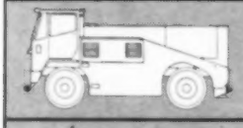
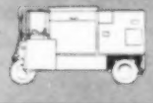
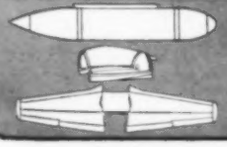
CAPABILITIES . . . Manpower, Tools and Experience

The amazing photograph at right was taken by Tom Ashley, managing editor of *Flight Magazine*, at the National Aircraft Show in Oklahoma City over the Labor Day weekend. It shows a U. S. Army L-23 Beechcraft making a successful takeoff and climb over a simulated obstacle, represented by the two poles. A previous takeoff by another make airplane had cut the upper ribbon, which the photo shows as broken. The number at the base of the pole represents the distance in yards from the beginning of the takeoff run of the L-23.



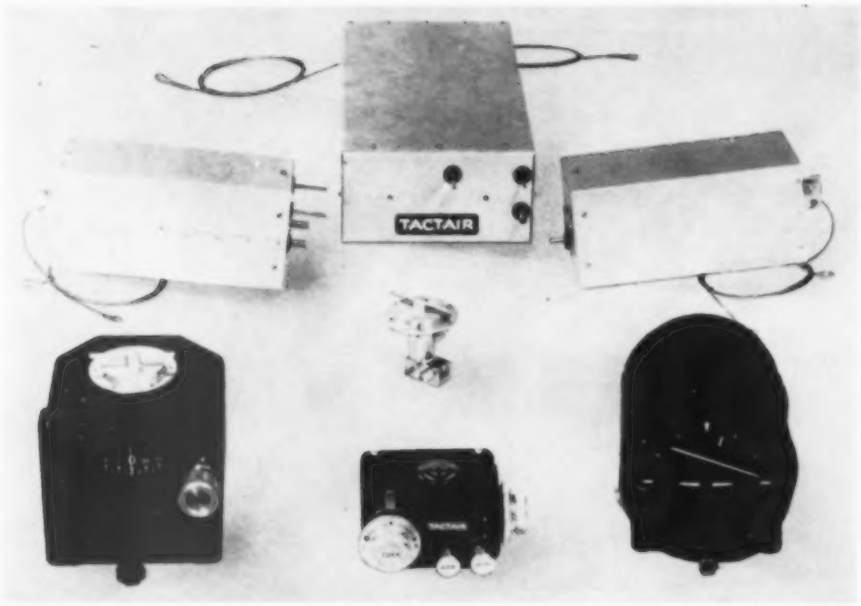
The U. S. Army L-23B transport, rugged military version of the famous Beechcraft Twin-Bonanza, has a proud and distinguished record of service. First ordered into military production in 1952, the L-23 was the first twin-engine airplane used by the Army Field Forces. From the battle fields of Korea to the training fields at home, and back again to foreign stations, the L-23 has met the exacting demands of military service with distinction. Today, the Army's confidence in the L-23B's dependability and superior performance has resulted in new orders to fill the Army Aviation Division's expanding needs.

We're happy to welcome the United States Army to the long list of enthusiastic "re-order customers" . . . evidence again that Beechcraft has the manpower, tools and experience capabilities to design and produce quality aviation products.

BEECH BUILDS	
	MA-3 MULTI-PURPOSE VEHICLES
	C-26, MD-3 POWER UNITS
	B-PLACE BEECHCRAFT SUPER 18
	6-PLACE BEECHCRAFT TWIN-BONANZA
	4-PLACE BEECHCRAFT BONANZA
	BEECHCRAFT T-34 TRAINERS
	BEECHCRAFT L-23 TRANSPORTS
	TANK-WING-MAJOR SUBASSEMBLY SUBCONTRACT PRODUCTION

Beechcraft

BEECH AIRCRAFT CORPORATION, WICHITA, KANSAS, U. S. A.



The new Tactair T-3 autopilot consists of the seven components shown in the large photo, with close-ups of the control head at right. Completely pneumatic and non-electric, T-3 operates off the aircraft engine vacuum pump with small air gauges on gyro instruments sensing aircraft attitude changes and bellows-type servos actuating aircraft control system changes. Directional gyro has course selector knob and extra heading card above regular compass card. Aluminum cases contain pneumatic amplifiers and bellows-type servos for elevator control (center) and ailerons (left and right). Master shut-off valve is at center, above command control head. Control head, pictured at right, contains aneroid capsules which relay pilot's directions to servos. Master button is on-off control. Heading button is for use of the course selector, and conventional turn and nose-up-down knobs are provided. Excluding gyros, installed weight is less than 10 lbs., including small neoprene tubing which connects the units.

Pneumatic Tactair T-3 Autopilot

DELIVERIES are now being made of the new Tactair T-3 three-axis autopilot for business planes, already approved by CAA for installation on Bonanzas with approval for Cessna 180 and Piper Tri-Pacer coming up. Installations on light twins will be approved in the first half of 1957.

Simplicity and light weight distinguish the Tactair T-3, which operates pneumatically and weighs less than 10 lbs. completely installed in a Bonanza. It is priced at $2,395.

No electrical power is used, the T-3 using pneumatics for both sensing and operation of the flight controls. This eliminates complexities and weight. A new concept in autopilot design and operation, it employs pneumatic measurement and control which have been utilized for other systems and operations.

Air, or suction, gauges incorporated in the directional gyro and artificial horizon are coupled with cams, whose movement registers aircraft attitude changes and varies the gap of air over the suction gauges. Measurement of this gap of air produces variations in amount of suction, giving accurate sensing to pneumatic amplifiers which activate servos coupled to the aircraft controls. These servos are small but powerful bellows, which can exert a pull of as much as 125 lbs., although less than half this force is required. Suction is provided by the aircraft engine vacuum pump and the sensing units operate at 4 inches of mercury while the control servos operate on an 8-in. vacuum. The air is piped through small, lightweight neoprene tubing.

Variable sensing eliminates on-off action and jerky responses. There are no clutches, no electronic tubes and the pneumatic pilot is not constantly at work except when making changes. It is engaged instantly, with no need for warm-up.

An interesting feature is that the pneumatic pilot uses no follow-ups to report back to the unit after a control movement has been changed. The Tactair unit is described as having an inherent force follow-up characteristic which eliminates this feed-back.

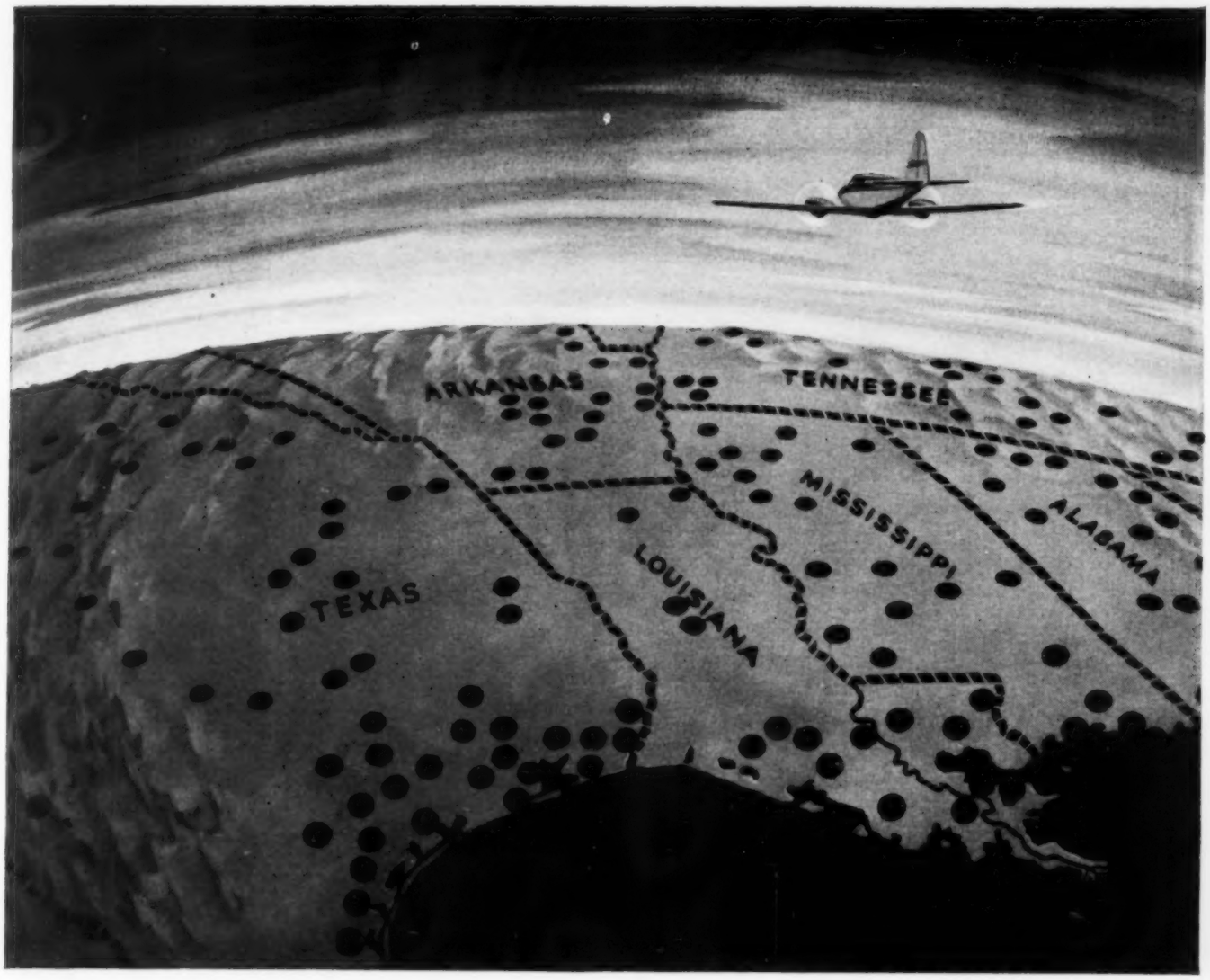
While cams are installed within the gyro instrument cases, there is no mechanical contact with the gyro-operated parts of the horizon or directional gyro. This allows them to operate completely undisturbed by such complexities as micro-switches or brushes.

One of the Tactair's major virtues is a heading lock and memory. With the heading lock, the pilot can set his course selector to the heading indicated on his navigation receiver or for an ILS track. If wind causes drift, the pilot merely corrects the course selector of the directional gyro and the Tactair automatically makes the correction.

This course selector consists of an additional circular heading card installed by Tactair above the regular compass card of the directional gyro. To fly a course of, say, 312 degrees, the pilot merely sets the course selector card to that heading, pushes in the control unit's heading lock button, and the T-3 automatically turns the airplane to the 312-degree heading, holding the course indefinitely. The heading lock takes hold and will bring the airplane on course even if the plane is heading as much as 90 degrees to either side of the desired course. The directional heading capability also has an inherent memory — if it becomes necessary for the pilot to alter course by manually over-riding the autopilot, the T-3 will automatically return the aircraft to the course as soon as the controls are released.

The installed weight of less than

(Continued on page 70)



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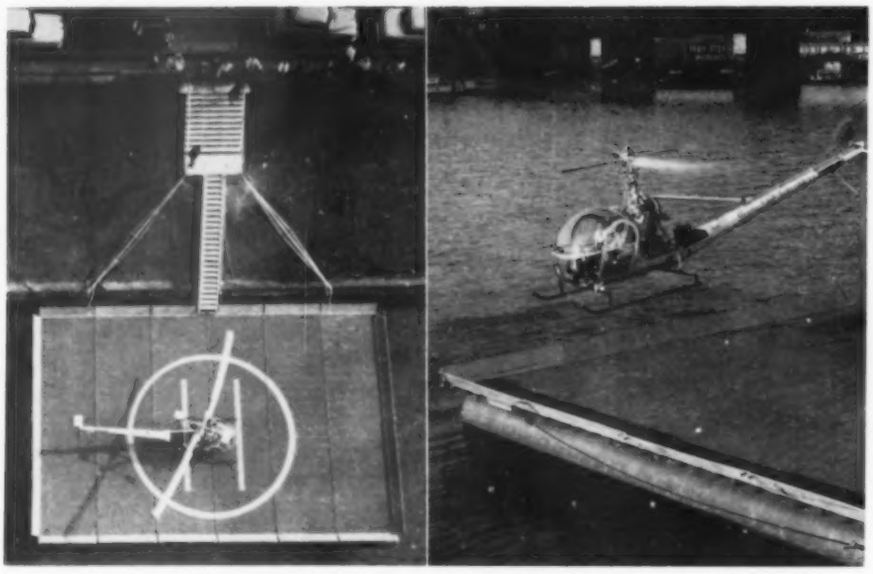

Here's a floating heliport operated in the mid-town Pittsburgh area by Industrial Helicopters, Inc. It was constructed by Standard Heliports, Inc., Minneapolis, at a total installed cost of less than $30,000. This heliport is a six-section model having a 40 by 60-ft. operations area. Perforated embossed plate is used for decking and its pocket formations produce an effect which stabilizes the rotor downblast for a marked decrease in power requirements for take-off. It also eliminates collection of water or other liquids. A 3-place Hiller is shown operative from it.
—(Hiller Photos.)

One of several new heliports in the Chicago area is pictured above — the Conrad Hilton Hotel's new rooftop heliport (note lakefront Meigs Field in background just below horizon). Helicopter Air Lift, a division of Skymotive, Inc., has a three-year agreement to provide helicab service from the rooftop, which is 6 mins. from Midway and 12 mins. from O'Hare airports. An HAL Bell air taxi is shown on the heliport.
(Conrad Hilton Hotel Photo.)

HELIPORT STANDARDS

(Continued from page 41)

landings in the event of power failure is a unique helicopter characteristic and the selection of a site must insure that clear ways are provided to handle this contingency.

Other factors must be considered. (1) The performance of future multi-engine helicopters, which are perhaps five years away, is not known to the CAA. Therefore, these proposed standards are based on the largest single engine helicopters available commercially, i.e. the Sikorsky S-55 and the Sikorsky S-58, certificated on August 2, 1956, at a gross weight of 12,700 pounds. (2) It is generally agreed that future multi-engine helicopters will probably require less area for landing and taking off than present single-engine machines. It is conceivable that multi-engine helicopters, for example, would take off vertically to cruising altitude and be able to safely descend to the heliport, should one engine fail. Therefore, it is expected that heliports built for the largest single-engine machine should be able to handle future multi-engine equipment. (3) The site chosen should provide two-way operation and should be aligned into the prevailing winds. (4) The take-off area in all cases requires greater length than the landing area. Therefore, if a dimension is adequate for take-off, it should provide sufficient area for landing. (5) Instrument operation, while not considered feasible in a single-engine helicopter with present instrumentation, probably will be a consideration within the next few years, and the location and alignment of the heliport must provide for this potentiality.

Under this proposed standard, the heliport would consist of three distinct areas — (A) flight operational area, (B) ground operational area and (C) access paths.

(A) *Flight Operational Area:* The flight operational area includes the actual landing and take-off area, and a suggested dimension of 400 x 200 feet has been selected, based on the measured performance requirements of the Sikorsky S-55 and S-58. Using one of the same performance concepts as traditionally used for T-category aircraft (TO distance required to clear a 50-foot obstacle), on a standard day, sea level pressure altitude, 59° F. with TO power, the S-55 at 7,200 lbs. requires a take-off run of 455 feet, while the S-58 at 12,700 pounds requires a take-off run of 420 feet. (This TO run is not a TO run as we know it for fixed-wing aircraft — the helicopter starts its take-off from a hover, normally).

In addition to this dimension of 400 feet x 200 feet, which should be surfaced to provide protection for the necessary impact loads, we feel it necessary to provide an additional 200 feet of clear area at either end of the 400 foot length, obstruction free, and suitable for straight ahead roll-on landings following engine failure prior to reaching the climb-out speed. It is assumed that if an engine fails prior to reaching the 50-foot point, the pilot

NEWEST TRANSCENDENTAL TILTING ROTOR CONVERTIPLANE has begun pre-flight operation at Transcendental Aircraft Corporation's plant, Glen Riddle, Pa. The TAC Model 2 was completed in only 7 months on a U. S. Army contract. It will be powered by a 250 hp. engine and will incorporate features developed from the TAC Model 1G which made over 100 successful flights in 1954-55, including conversions up to 90 per cent, the maximum ever attained by a tilting-rotor convertiplane.

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FIRST NON-STOP COAST-TO-COAST HELICOPTER FLIGHT was made last August by an Army Vertol H-21 which was refueled by an Army U-1A de Havilland utility fixed-wing aircraft. The flight from San Diego to Washington's Pentagon covered 2,610 miles in 32 hrs.

must land straight ahead. This total of 800 feet x 200 feet would be considered the minimum basic dimension and would be under the control of the heliport operator, properly fenced for public protection.

(B) *Ground Operational Area:* The elements which comprise this area will vary, as on a conventional airport. They include aprons, taxiways, parking, servicing and cargo and passenger loading and unloading areas. On the larger heliports, perhaps these elements might also include hangar, storage and maintenance facilities.

It is generally agreed that this ground operational area should be designed so as to require a minimum amount of taxiing, and that a loading time of 5 minutes will suffice to handle passengers and cargo. Parking spots, taxiways, etc. should be located so as to provide a minimum of 50-ft. clearance between rotor blades of adjacent helicopters, and should be clearly ground-marked. Rotor diameters and over-all lengths of current large helicopters are 53 feet and 62 feet 5½ inches for the S-55 and 56 feet and 65 feet 10 inches for the S-58. Future multi-engine helicopter rotor diameters will run as high as 82 feet for the Vertol YH-16A Transporter and 90 feet for the Sikorsky S-56.

(C) *Access Paths:* These access paths are considered to be a continuation of the actual landing and take-off areas, and should provide an obstruction-free flight path with an obstruction clearance slope line of at least 8:1. This approach path, extending outward to 3,000 feet and flaired to a 1,500 feet width, should have enough open area to provide emergency landing spots until the helicopter reaches its en route altitude. This area provides the necessary protection for engine failure during the approach and departure of the single-engine helicopter, and assumes that maneuverability of the machine will give the pilot some selection of his emergency spot. The access path area need not be under the operational control of the heliport management. However, control of obstructions should be planned for through zoning or navigational easements. This area could consist of parks, railroad right of way, rivers, parkways, or other open areas suitable for auto-rotational landings. It could be a curved area, since it is permissable to bank on the climb out, not to exceed a 15° bank.

Roof-Top Heliports: A word in passing may be appropriate concerning roof-top heliports, which are being used with some success in New York, Chicago and Los Angeles, but only with the smaller and more maneuverable S-51's and Bells. We believe that insufficient operational experience has been gained in roof-top operation to lay down an acceptable criteria at this time. Some advantages are to be gained, of course, in the use of roof-tops, provided the routes in and out have sufficient open areas for emergency landings, including open areas immediately adjacent to the buildings used. We hope soon to coordinate with the industry an acceptable roof-top heliports on Post Offices, hotels, garages, public buildings, etc. In the meantime, further study is needed to determine dimension, impact load stresses, fueling problems and the like.

Other Planning Factors: I have briefly outlined above one of the proposed standards for a ground level heliport. Other factors, of course, must be taken into consideration:

1. Rotor blast, particularly during take-off and landing, is a real problem, and steps must be taken to provide blast fences at suitable points. Furthermore, the entire surface of the operating areas should be dust-free to prevent personal discomfort and to insure that no foreign object is picked up in the rotor system.

2. The location must be planned in relation to existing airports and traffic flow.

3. Multiple heliport sites in larger metropolitan areas would appear to be a necessity, based on traffic potential.

4. The heliport must provide adequate lighting facilities for night operation.

5. At the present time, noise caused by rotors, gear-box and engine exhaust is a very real problem. Cursory readings taken recently on an S-55 may illustrate this point. On a 70° F day at LaGuardia Field with an ambient noise level averaging 74 decibels, the S-55 noise level was measured at 136 decibels in a hover, five feet from the exhaust, and 111 decibels at a distance of 100 feet from the exhaust. During take-off, 200 feet away and 75 feet under the helicopter, the level was measured at 118 decibels. During cruise at a height of 200 feet it produced 105 decibels and at 400 feet, 98 decibels. Bear in mind that the School of Aviation Medicine at Randolph Air Force Base finds that there is danger of damaging the human ear when noise reaches 90 decibels; the level that causes discomfort to humans is 120 decibels; and the "pain-tickle" level is 140 decibels. Also bear in mind that the S-58 has approximately 150% more power.

The dimensions noted above very briefly are tentative standards, and I want to emphasize that they are in the proposal stage only. As I have pointed out, the unusual characteristics of the helicopter have run away with the imagination and led most people to conclude that it takes off and lands vertically, needing only a postage stamp size heliport. Of course it can — aerodynamically — but without the operational safety which contemplates engine failure at any time. We must therefore provide the necessary real estate for emergency landings. Of course, if the heliport were located on flat, unobstructed terrain — a golf-course, for example, with Par 5 fairways leading in and out, the actual heliport pad need be only large enough to contain the wheel tread and wheel base. The same holds true for bull's-eye pads on airports.

Helicopters sell one thing — time. With short stage lengths and frequent landings using multiple landing sites, heliports should be designed for rapid loading and servicing, just as the helicopter itself must be so designed. The standards finally adopted, therefore, should provide enough flexibility to realize the full potential of the helicopter as a commercial vehicle, to provide heliport planners sufficient freedom in the selection and construction of suitable sites, and to insure against early obsolescence.

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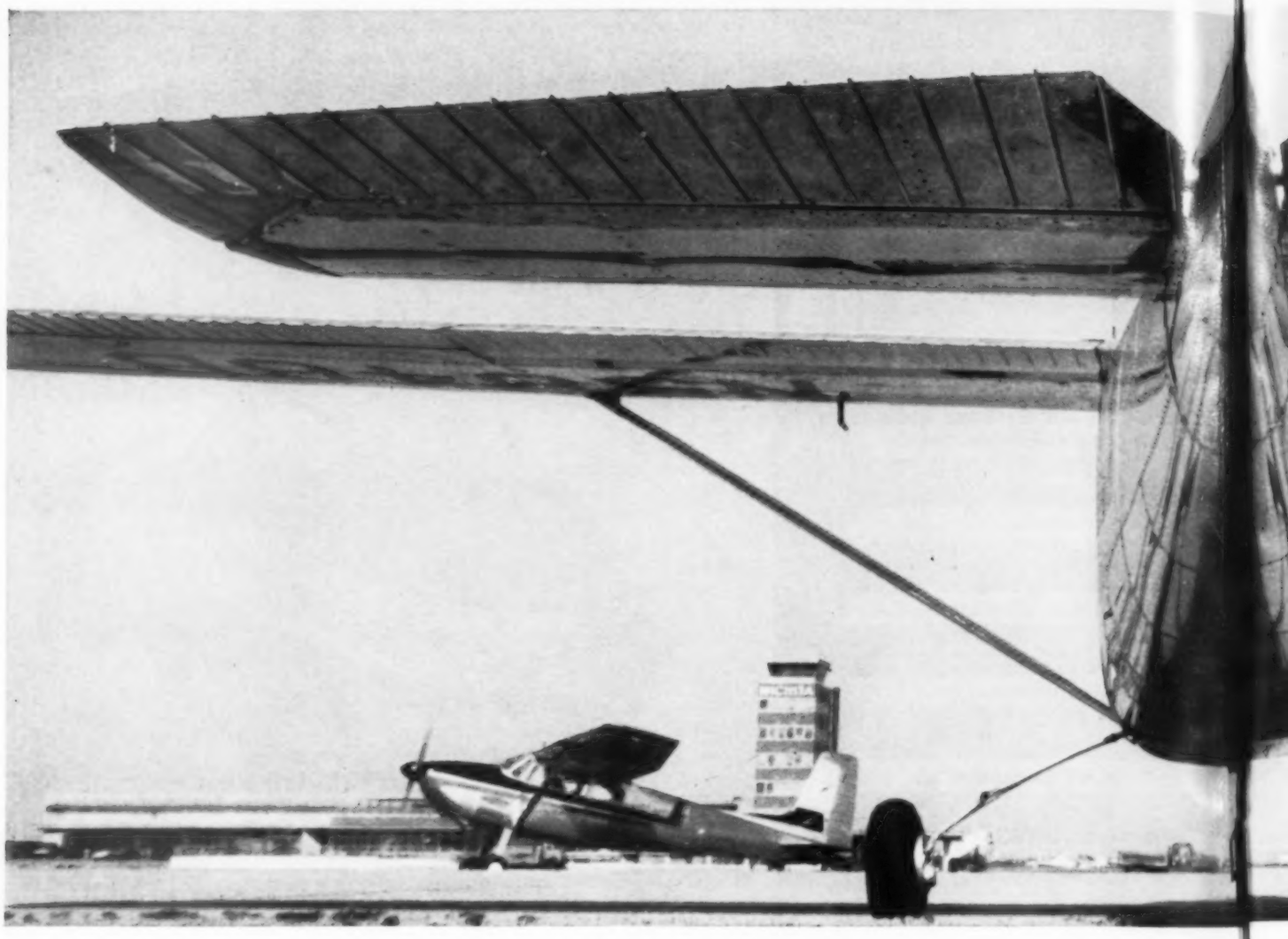

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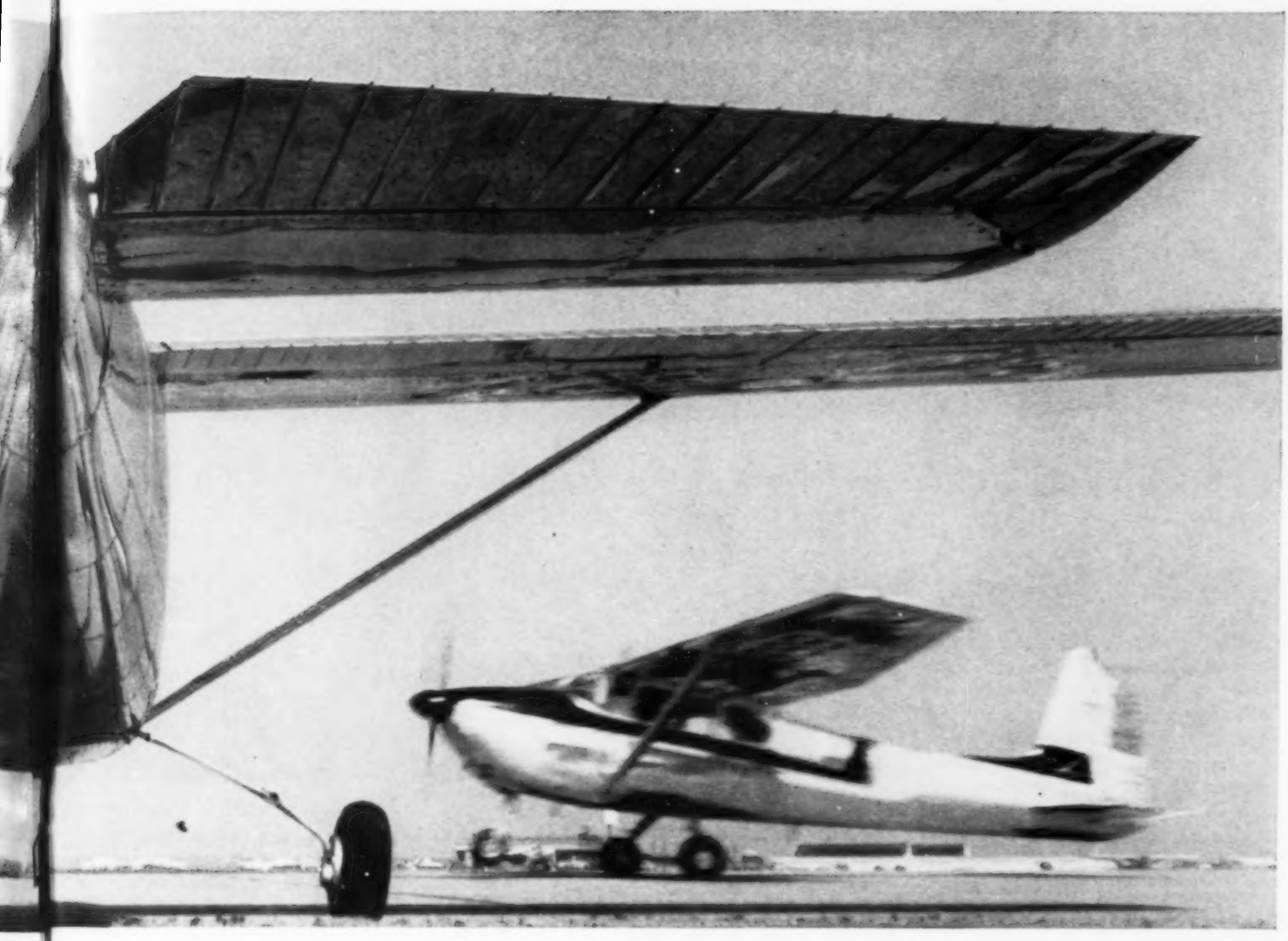

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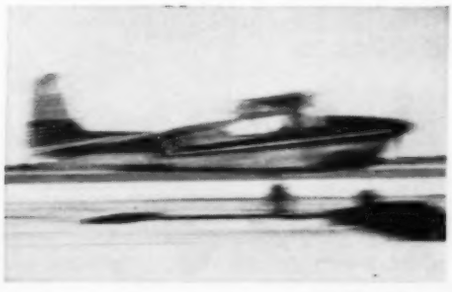

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HELICOPTERS FOR FIRE FIGHTING have proved interesting and valuable examples of utilization. At upper left, a Bell Model 47 reels out hose for a grass fire in California. In the photos above and at right, a Kaman HOK-1 carries a 3-man fire-fighting team and Ansul dry extinguishers to practice fighting a simulated airplane-crash fire while the pilot beats back the flames and heat with rotor downwash. A dummy in the "crash" was removed only 45 seconds after arrival on the scene.
—(Bell and Kaman Photos.)

HELICOPTER TESTING

(Continued from page 32)

tests, such as landing gear drop test, fuselage static test and flight tests — plus very extensive dynamic component tests such as main rotor and tail rotor whirl tests, main and tail rotor transmission deflection tests, transmission bench tests and extended tie-down tests of the helicopter itself. Coincident with all this, and almost equal in magnitude, is a fatigue testing program. Here the equivalent of many dynamic and critical components are tested to destruction in fatigue machines duplicating excessive flight loads.

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CERTIFIED BEECHCRAFT SALES & SERVICE

Gray Aircraft Service Co., Inc.

LOVE FIELD DALLAS

BENDIX-DECCA CHAIN

(Continued from page 33)

Flight Log.

The Fort Worth Decca Chain will feature a master and only two slave stations located at Granbury, Jacksboro and Ennis, respectively, and the actual operating area will be reduced to the area within approximately seventy-five miles of Fort Worth. This will be adequate for the individual purposes of the two companies, however, and the accuracy of the system in this area will not be affected by eliminating the purple slave station.

The first installation of this lightweight system in a Bell helicopter model will present the position information to the pilot on two decometers. A second installation featuring the Decca Flight Log with the pen and the moving map will be made later. Both installations have been thoroughly proven as far as the Decca equipment goes, so it will remain for Bell to see just how well Decca ties in with other helicopter instrument flight equipment currently being developed by the helicopter manufacturer.

The primary goal of Bell's helicopter instrument flight program is to make possible the safe operation of helicopters in remote areas at night or during instrument flight conditions. While navigation under these conditions is, practically speaking, still a problem, there are other facets of the program that are keeping the Bell electronics and flight test engineers awake nights. Fuselage attitude information as it is normally presented to airplane pilots, for example, is usually satisfactory for helicopter pilots while they are cruising at relatively high forward speeds. It is when they get into the conditions of flight below the fixed-wing aircraft's stalling speed that these conventional attitude instruments lose their effectiveness. The helicopter pilot, on the other hand, must have attitude, heading, air speed, etc., information throughout the entire performance range of his craft or else he will be restricted during instrument flight conditions to the narrow range within his present instruments' capabilities. This is the condition existing today, and the country is losing the versatile low-speed performance of these remarkable craft during instrument flight conditions.

We know also that the relatively insensitive fuselage attitude gyro presentation is not satisfactory when a helicopter pilot is operating his machine on an approach at low speeds. He must have a more sensitive indication in this case, which really means that the attitude system must have variable gain according to the flight condition. Also, the best sensitivity around the lateral axis is apparently not the most desirable adjustment with respect to the longitudinal axis. These more sensitive attitude displays require more of the pilot's scanning time, too. Since the aircraft is approaching the ground, the pilot is also going to need absolute altitude information, landing spot position and ground speed information as his air speed falls off. The problem, therefore, becomes one of investigating such things as contrasts, compatibility, movement and direction, clutter, brightness, position, scanning time and sensitivity of each display as well as the entire instrument flight system.

The Bendix-Decca system will enable Bell pilots and engineers to simulate flight in remote areas and practice instrument approaches while investigating and developing the other necessary sensing and presentations. Those characteristics which make Bendix-Decca a fine tool for this helicopter instrument flight research also appear to make the system desirable for the actual remote area helicopter instrument flight problem. These include the following advantages:

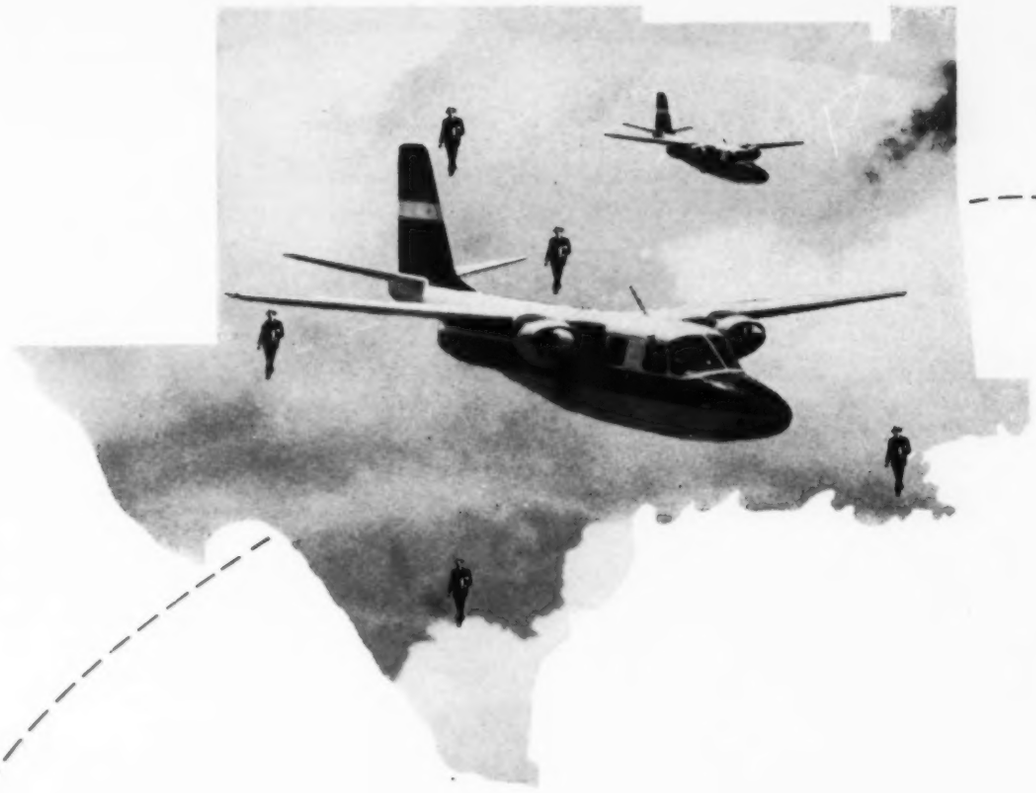
1. Reception of Decca transmissions is not restricted to line of sight.
2. Position information is accurate.
3. Immediate position is indicated with a minimum of interpretation time.

Bell engineers have already developed an attitude presentation that appears to offer a considerable number of improvements over present instruments. Preliminary tests indicate that the new presentations are apparently easier to read and give the pilot a more sensitive presentation in the low speed range where present instruments fail.

At the present rate of progress, it may not be many months before Bell Aircraft's goal of remote area instrument flight capability for helicopters will be a reality for both commercial and military machines. The Bendix-Decca Navigation System is certainly helping to hasten this long needed advance to the present state of the art and should make flying helicopters in the Fort Worth area a new experience, indeed.

NOTABLES AT NATIONAL BUSINESS AIRCRAFT ASSOCIATION'S RECENT MIAMI BANQUET included (bottom photo, left to right) Edward P. Curtis, President Eisenhower's special assistant for aviation facilities planning; Civil Aeronautics Board Member Joseph P. Adams; George Halpin, Minnesota Mining & Manufacturing vice president; (upper photo, left to right) Pat Walker, "Miss Business Aviation, 1956"; Capt. Eddie Rickenbacker of Eastern Air Lines, and Henry W. Bogess of Sinclair Oil, NBAA president.

—(NBAA Photos by Hans Groenhoff.)



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FOREIGN DISTRIBUTORS FOR PIPER AIRCRAFT are pictured above at the recent sixteenth annual Piper distributor meeting in Lock Haven, Pa., attended by over 200 distributor personnel. Left to right are James Leaver, Bogota, Colombia; Allan Peppin, Switzerland; Christopher Oberholtser and John Van de Woude, Pretoria, South Africa; Maurice Franco's, Paris; Mario Bossi of Jonas Aircraft, New York; Robert Goemans, Paris; Robert Louis, Paris; W. T. Piper, Sr.; Edwardo Cruz, Chile; Alexander Muller and Jeff Steinemann, Jonas Aircraft, New York, and Robert Armstrong, Glenn White, Stewart Alexander and Roy Moore, all of Trans Aircraft, Hamilton, Canada.
—(Piper Aircraft Photo.)

TOP-RANKING PIPER AIRCRAFT DISTRIBUTORS IN SALES wore top hats at Piper Aircraft's annual sales meeting. Seated, left to right, are Art Whitaker, Vancouver, Wash.; Glenn Barr, Detroit; John Baker, Long Beach, Calif.; W. T. Piper, Sr.; Angelo de Ponti, Minneapolis; and Alexander Muller, New York. Standing, left to right, are W. T. Piper, Jr.; Les Longbrook, Denver; Roy Neal, Lubbock; Howard Gregory, Des Moines; O. P. Hebert, Teterboro; R. S. Northington, Winston-Salem; Lloyd Brown, San Antonio; George Edgcumbe, Elmhurst, Ill. Baker was tops with 166 sales, Whitaker second with 82 and Edgcumbe third with 77.
—(Piper Aircraft Photo.)

Piper Sales Goal is $36,000,000 for 1957

PIPER distributors sold $31,000,000 worth of new Super Cubs, Tri-Pacers and Apaches during the 1956 fiscal year ended October 1 — a 55% increase over sales for 1955. With the new low-wing, all-metal 4-place Comanche (pictured below) available for deliveries beginning next April, sales in 1957 are expected to top a quota of $36,000,000 in retail volume. Two versions of the Comanche will be available, one with a 180-hp. 4-cylinder Lycoming, 160-mph. cruise and priced at $13,500 and another with a new 6-cylinder Lycoming of 250 hp., 185-mph. cruise and priced at $16,900.

TACTAIR AUTOPILOT

(Continued from page 58)

10 lbs. excludes the two modified gyro instruments, which are exchanged to replace existing gyros in the airplane's normal weight.

Basic installation components of the Tactair consist of the command control, measuring 3.5 ins. wide by 2 ins. high and 2.5 ins. deep, and three control boxes which incorporate basic sensing and simplification valving and the actual bellows-type servos. One of these units combines two servo elements for elevator control. The other two smaller control units are embodied in the aileron system. No rudder control units are considered necessary for aircraft which are basically controlled directionally by ailerons, but a separate rudder control system which can be added is in development and will be ready late in 1957 for those aircraft requiring rudder sensing.

The first four pilot models of the Tactair were installed two years ago on Bonanzas after CAA approval for the Bonanza. Next installations scheduled for CAA approval will be in the Cessna 180 and Piper Tri-Pacer, with approvals for light twin-engine aircraft expected by next July.

Tactair, Inc., a research and development firm at Wings Field, Ambler, Pa., began development of the Tactair autopilot over three years ago as a research program for the Navy. This project was headed by William Harcum, who had spent 11 years with Sperry as a research engineer engaged in autopilot development. The project's purpose was to develop an automatic flight indication for Navy pilots which would permit manual flight of an airplane with a "feel" sensing relayed to the pilot as to the aircraft's attitude.

A "tactile" indicator was conceived on the premise that there are conditions, such as low level flight over water or rapid changes from instrument to visual flight, when the pilot should be on instruments yet feel free to monitor any visual references. From the word "tactile," which means feeling through the fingers, the name Tactair evolved.

Now Tactair is the autopilot division of Aircraft Products Company, Bridgeport, Pa., founded in 1940 and specializing in the design of precision equipment for aircraft pneumatic and hydraulic systems, particularly valves. The company has become a principal supplier of precision equipment for major airframe manufacturers.

★ ★ ★

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CESSNA 182-180 FACTORY DATA — DECEMBER 1, 1956

	Model 182	Model 180	180 Floats	180 Amphibian
Price	$13,975	$13,250	———	———
Engine (Cont'l., 230 hp. @ 2,600 rpm.)	O-470-L	O-470-K	O-470-K	O-470-K
Top Speed, SL, mph.	165	170	149	149
Cruising Speed, 70% hp. @ 8,000 ft., mph.	155	160	146	146
Cruising Range, 70%hp. @ 8,000 ft. —				
Miles	655	675	615	615
Hours	4.2	4.2	4.2	4.2
True Air Speed, mph.	155	160	146	146
Maximum Range, 10,000 ft., dry —				
Miles	805	845	820	820
Hours	7.1	7.1	7.4	7.4
True Air Speed, mph.	114	120	110	110
Fuel Capacity (55 gals. usable), gals.	65	65	65	65
Rate of Climb, fpm.	1,030	1,130	1,070	1,055
Service Ceiling, ft.	19,800	21,500	17,000	16,800
Ground Weight, lbs.	2,650	2,650	2,820	2,850
Empty Weight, lbs.	1,560	1,555	1,822	2,034
Useful Load, lbs.	1,090	1,095	998	816
Baggage Capacity, lbs.	120	120	120	120
Span, ft.	36	36	36	36
Length, ft.	26	26	26	26
Height, ft.-ins.	8-6	7-6	12	12-4
Wing Area, sq. ft.	175	175	175	175
Wing Loading, lbs. sq. ft.	15.1	15.1	16.1	16.3
Power Loading, lbs. hp.	11.5	11.5	12.2	12.4

NOTE: All performance is for gross weight at sea level unless noted. Model 180 has castering wheels as standard equipment.

NEW CESSNA 182

(*Continued from page* 51)

ening the "Land-O-Matic" nose gear 2 inches for an over-all change in attitude with a ground angle of about 7 degrees, and by lowering the main gear 4 inches and expanding the tread 5.4 inches. The same propeller clearance as in the 1956 model has been maintained even though the airplane sits lower. This was accomplished by rotating the entire fuselage downward with the prop hub as the axis. Main gear spring steel legs have been increased in thickness from 11/16 to 3/4 inch, and tires have been increased from 4 to 6 ply. The new "lower look" makes the 182 more attractive this year than last, as well as improving the airplane's stability on the ground in high and gusting winds. In flight, with the nose strut extended, a lock engages automatically to prevent the nosewheel from turning. It is steerable by the rudder pedals on the ground.

Front and rear seats have been redesigned with greater emphasis on posture and comfort. A new and stronger seat frame on front seats with an additional 1-inch overhang and a square, recessed back provide more support and comfortable seating. The seat hinge area is completely hidden. A plastic and metallic binding with metallic-weave nylon add to the appearance. Rear seats have squared backs for additional support and indentation for easier reach of the four-position rear seat adjustment for accessibility to the luggage compartment in flight.

The 182 and 180 cabin, one of the roomiest and most comfortable among 4-place airplanes, has been given an even more finished appearance by several innovations. Pits for fuel gauges have been removed to improve headlining appearance, ash trays have been

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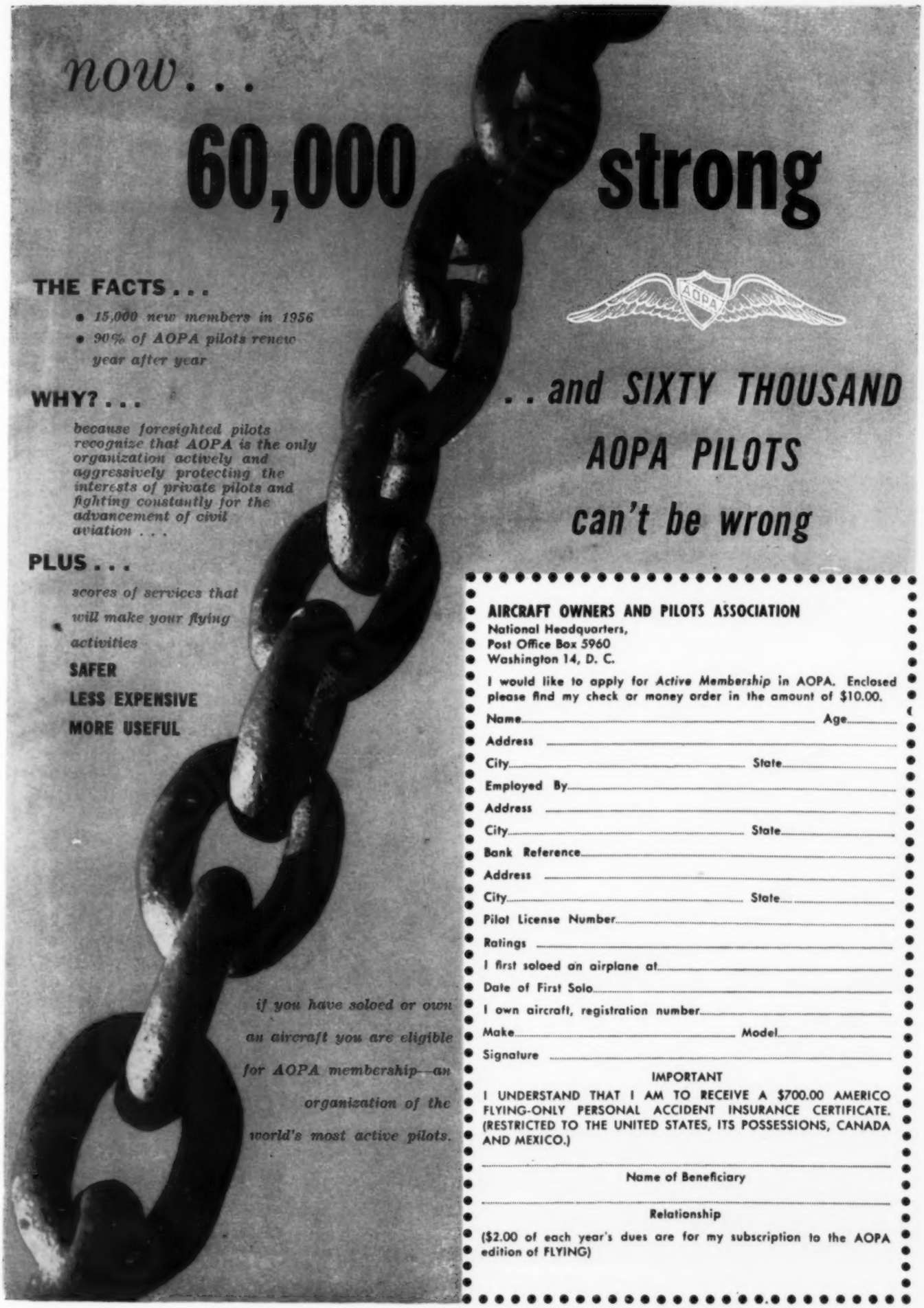
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relocated behind door posts to prevent spilling or blowing in rear seat areas, and upholstery has been rolled around the door posts. Trim, scuff and headlining areas are upholstered in washable vinyl. Two new interior color combinations are Target red with white and Cascade green with tan. Exterior colors, featuring a new paint layout, include Sunstone yellow, Empire green, Jamaica coral and Palomino cream, all highlighted with black.

Up front, primary instrument changes include a completely new panel with functional design for easier and more accurate reading at a glance. Electric fuel gauges are installed for the first time, eliminating the direct-reading gauges formerly located in the headliner. They are now located on the panel in a neat engine grouping with tachometer, manifold pressure, oil pressure and temperature. The air speed indicator has both miles and knots for easier reading and the compass has been windshield mounted.

Flight instruments are more functionally grouped so that four radios and additional instrumentation can be installed on the panel without losing the map compartment. This has now been tilted to prevent spilling of its contents. The sub-panel has been redesigned for more styling and better utilization of space. The new panel is the most effective and most attractive ever achieved by Cessna.

Outside baggage door on the Model 182 is located on the left side behind the rear seat and has a key lock, with flush-fitting latch. —(Cessna Photo.)

Two innovations this year are an indicator light for the generator, which remains lighted until charging begins. It eliminates the ammeter and doubles as a master switch indicator when the engine is not operating. New, too, is a provision for draining the fuel bowl from the cabin — this is accomplished by a control knob below the instrument panel, connected to a valve on the fuel strainer.

Both the 182 and the 180 are powered by a 6-cylinder Continental Model 0-470 engine, rated at 230 hp. at 2,600 rpm. The factory says a new carburetor is featured this year, offering fuel consumption improvement over last year's model. The 182 does not have cowl flaps, which are used on the 180.

TURBOPROPS

(Continued from page 54)

mph. Fuel consumption averages about 300 gals. per hr. for cruising, or a little less than 1 gal. per mile of distance at cruising speed.

One problem facing U. S. operators of executive Viscounts will be fuel availability—the turbine power plants use kerosine which is available only at airports providing service to airlines operating Viscounts. As an example, a recent Viscount charter trip is said to have required a fuel stop 100 miles off-course on both the outbound and return trip.

As the year 1956 draws to a close and the holiday season approaches, we would like to take time out to say a word of thanks to our many friends and customers who have made our many years in business such a pleasure. We are deeply grateful for the opportunity of knowing and serving you and we look forward to many more years of our association.

To you, from all the folks at AIRCRAFT SALES COMPANY, we wish this to be your happiest Christmas ever and your weather CAVU as you take off into the NEW YEAR.

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A NEW BEECH AIRCRAFT SUBSIDIARY, Beech Acceptance Corp., has been established to finance business plane sales including floor plan for distributors and dealers, retail sales and customer leasing. Officers (left to right) are Mrs. O. A. Beech, chairman; Frank E. Hedrick, president; A. R. Bell, vice president, and John A. Elliott, secretary-treasurer. All are officials of Beech Aircraft Corp. Bell will be operating manager of Acceptance Corp., located in Beech headquarters.

No details have been released on the custom interiors which the U. S. Steel and Standard Oil Viscounts will feature. The Viscount cabin interior is about the equivalent of that of the Convair Liner, having a 39-ft. length, 9-ft. width and 6.5-ft. ceiling into which 48 passenger seats are fitted in the standard airliner version. Pressurization provides a sea level cabin at 15,000 ft. and a 5,000-ft. cabin at 24,000 ft. The cabin has 20 large, oval-shaped windows, each measuring 26 ins. deep and 19 ins. wide. Exterior dimensions include 94-ft. span, length of 81 ft., 9 ins. and height of 27 ft., 9 ins.

Design weights are: Empty (bare), 34,700 lbs.; maximum zero fuel, 49,000 lbs.; maximum landing, 57,500 lbs.; maximum take-off, 60,000 lbs. (clean), 62,000 lbs. (with slipper tanks), and 63,000 lbs. (with slipper and belly tanks). Empty weight of the two slipper tanks is 310 lbs. while the belly tank installation has a 700-lb. weight. Provisions include 154 lbs. for full oil tanks and 510 lbs. for a representative quantity of water-methanol for injection during take-off in hot weather. ★ ★ ★

SUPERCHARGED GULL

(Continued from page 49)

1,930-lb. useful load. For cargo, it has a 2,030-lb. useful load, the empty weight for the cargo configuration being 4,670 lbs.

Fuel capacity of 190 gals. offers a cruising range of more than 900 miles at 50% horsepower (2,600 rpm.)

Performance includes 190 mph. at 70% horsepower (2,750 rpm.) at 13,500 ft.; 188-mph. high speed at sea level and 208 mph. high speed at 12,000 ft. Stalling speed at sea level is 72 mph. with flaps and 79 mph. without flaps. Minimum single-engine control speed is 91 mph.

The Super 200 has inside cabin dimensions of 96 inches for length, 48 inches for height and 54 inches for width, with two doors measuring 36 by 40 inches.

Two baggage compartments can accommodate maximum loading of 420 lbs. — 300 lbs. in the aft compartment having 41 cu. ft. and 120 lbs. in the forward compartment having 10 cu. ft. ★ ★ ★

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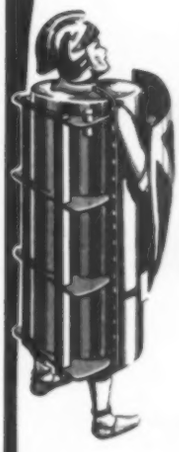

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BEECH TWIN-BONANZA

(*Continued from page* 53)

marked reduction in drag if you'll kick the prop around with the starter until it's in the horizontal position, parallel with the wing.

The entire power plant installation is readily accessible for servicing and maintenance, which makes a big hit with our mechanics. Nacelle cowlings are hinged at top and when open expose the entire engine and accessory sections. Moreover, the tricycle landing gear configuration places the engine close to the ground, which means you don't need ladders and work stands during most service operations.

The fact that engine maintenance is easier enables us to realize a high degree of aircraft utilization.

For a plane of its size, the Twin-Bonanza is easy to fly. In fact, it handles much like its single-engine sister, the Bonanza, with slightly heavier control pressures. Any pilot checked out in a Bonanza should be able to make the transition to the twin-engine model without trouble, but — and this is an important point — he should be thoroughly checked out on the difference between a single and a twin. You don't just take an extra throttle in your fist and start flying. It's possible — but unhealthy.

Anyone acquainted with the Twin-Bonanza knows that the airplane is capable of truly amazing performance. On take-off, directional control is easily maintained with nosewheel steering and the rudder — brakes are used only in emergencies. The nosewheel is raised at 60 mph. and by the time you reach 75 mph., you're flying. Even fully loaded, the plane tends to leap off the ground like a scared rabbit.

Once airborne, however, it's best to level off until you gain 90 mph. indicated, the minimum safe single-engine speed. Then, if you want to get upstairs in a hurry, the airplane, at its maximum gross weight of 6,000 pounds, will climb at more than 1,450 feet per minute, using normal rated power — 3,100 rpm. and full throttle.

But a cruising climb is more advantageous since it will save fuel for the over-all flight. Apply 80 per cent power at 2,800 rpm. for a climbing speed of 150 mph. IAS, which gives you a 500-fpm. rate of climb. At altitude, reduce power to 65 per cent (2,750, 19.6 in. Hg.) and away you go at a neat 200 per. Mixture control is automatic, so the toggles are normally positioned full forward for all operations.

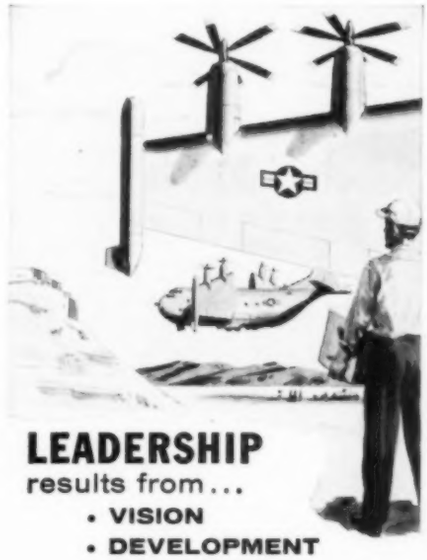
Landing approaches are made between 80 and 90 mph. The approach speed, of course, is governed by changing wind conditions, loading, weather, pilot technique and so forth. Main wheels should touch down first, then as the speed decreases, you ease the nose wheel gently to the runway. The airplane also handles well in a crosswind. Visibility in all directions is unusually good.

Extending and retracting the landing gear, adjusting power settings or the degree of wing flap, causes only a slight change in control pressures. Consequently, the controls on the Twin-Bonanza do not become uncomfortably heavy at times when you are busy with other matters.

Like any other aerodynamically-efficient airplane, the Twin-Bonanza will accelerate rapidly in a dive. Anyone planning to fly in instrument weather should be aware of this and be careful about getting the nose down. Stall characteristics are good and there is ample warning. In addition to the inherent warning, or buffeting, an indicator triggered at five per cent above stalling speed will signal an approaching stall.

Two other outstanding qualities I admire about this airplane are (1) its short field capability and (2) its single-engine performance.

The factory conservatively advertises that at maximum weight, with 20 degrees of flap, the plane will get



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off in 900 feet and clear a 50-foot obstacle within 1,200 feet. I find our experience agrees closely with factory data. And landing over a 50-foot obstacle is easy and safe. I've come in at 5,500 pounds and stopped within 600 feet of the approach end of the runway. That's performance — plus!

Probably one of the first considerations in selecting a twin-engine airplane is its ability to fly on one engine. Recalling my World War II demonstrations of the Lockheed P-38 Lightning, I know this question is foremost in every twin-engine pilot's mind. Like the P-38, the Twin-Bonanza flies almost as well with one fan as it does with two.

Doing a little experimenting on my own, I discovered that it's easy to make steep banked turns both into and away from the dead engine in complete safety and that with very little effort you can maintain altitude and directional control.

That is, if you've had instruction in twin-engine aircraft. I'm not here to give flying lessons, but any qualified instructor can show you what I'm talking about in a very few minutes. It's worth the time.

Minimum single-engine hands-off trim speed is 110 mph. Single-engine ceiling, with a full load, is approximately 8,400 feet, almost half the airplane's service ceiling of 20,000 feet. But get this: At maximum gross weight and sea level this airplane will climb 300 fpm. on one engine!

Another major factor in our choice of the Twin-Bonanza was the plane's structural integrity. Now, this is something close to my heart since I'm responsible for much of the structural testing at Lockheed. Which brings up a point.

When we first bought our single-engine Bonanzas, a few of our contemporaries criticized us for selecting the Bonanza over other commercial single-engine models. They claimed the Bonanza wing was weak and would fail at the slightest provocation. This is a real crock.

I've been a Bonanza owner for years. Just recently I returned from an 8,500-mile combination business and pleasure trip that took me clear to Pt. Barrow, Alaska, in my Bonanza. I encountered lots of weather and turbulence. It was no sweat. I've flown Beechcraft products for years. And I have the utmost confidence in the engineering and manufacturing skills of the people who design and build Beechcraft planes. After all, Beech made hundreds of wings for the F-94C Starfire interceptor and currently produces wings for the USAF T-33 and Navy T2V jet trainers, as well

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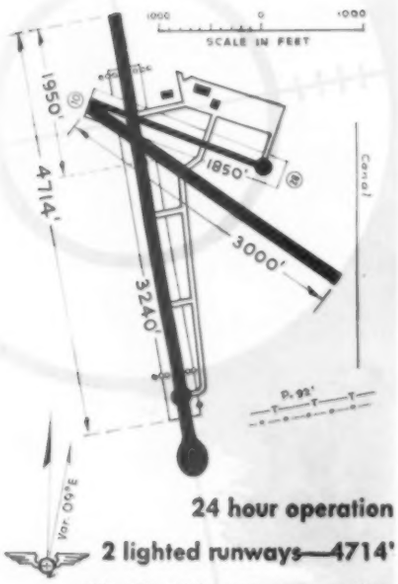

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as the aft fuselage section for the F-104 under subcontract to Lockheed.

True, Lockheed wings must be built to certain specifications. But the standards Beech established for its line of business planes are equally as stringent in relation to the intended performance. Any fool can tear the wings off an airplane by exceeding load limits, whether he's flying a Bonanza or an F-104. No one need fear the strength of a Beechcraft and I think statistics will prove that the Bonanza is one of the safest single-engine planes in the air.

I like the quality of workmanship that goes into a Beechcraft. A trip through the factory in Wichita is an enlightening experience and I heartily recommend it to anyone interested in seeing how these planes are assembled.

A few years ago, I had the pleasure of flying the all-metal "Cosmic Wind," a midget racer built by Tony LeVier, Lockheed's director of flying operations, and a group of experimental pilots and mechanics in their spare time. We won numerous races with the plane at Cleveland and elsewhere.

Being entirely handmade, except for the 85-hp. engine, the Cosmic Wind was of rugged construction and designed to exceptionally close tolerances. It had to be. Hurtling around pylons at better than three miles a minute imposes terrific stresses on any airplane — especially one weighing less than 600 pounds soaking wet!

Naturally, business aircraft, if properly flown, will never be subjected to the abnormal shocks and loads to which a racing plane is exposed. But it's reassuring to know that Beechcraft products are designed and built with the same meticulous care and precision — and incorporate safety margins far in excess of CAA requirements.

Sure, we've had a few problems. But even the owner of a brand new car will spend some time in the garage before the auto operates to his complete satisfaction. In this respect, the Norman Larson Company of Van Nuys, California, the Beech distributor from whom we bought our planes, bends over backwards to provide us with prompt, efficient and courteous service. In my opinion, this reflects a great deal of credit on Beechcraft's international sales and service organization.

There are some things we believe could be improved upon, like one small, but annoying detail — the inconvenient door latch. A different door arrangement might be the answer. (EDITOR'S NOTE: Later Twin-Bonanzas have an improved door latch.) But all in all, the Twin-Bonanza is the standard of comparison

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Fish Salmon before a test flight in the Lockheed F-104A, with one of the company's C50 Twin-Bonanzas in the background. He says the 200-mph. Beech is "like enjoying yourself in the comfort of a Cadillac" after flying the F-104A, which is 7 times or more faster. "They're both tops in their field," Fish says.
—(Photo by Erik Miller of Lockheed.)

for planes of its class.

In addition to transporting executives, pilots and other personnel, we use the three aircraft to haul small parts when they are needed someplace in a hurry. This could mean the difference between winning or losing a good contract. Our biggest customer, the military, is frequently in a hurry to learn the results of a flight test on a new model plane and our business is so competitive that a delay of a single day might mean that somebody else is selected as the supplier.

That's why we can't afford to take time to drive all the way from Burbank with a part when we need one fast out in the desert.

We also use the planes for practicing instrument flying under actual instrument flight conditions. Proficiency on instruments didn't mean much to test pilots at one time, but it is becoming increasingly important due to the nature of testing planes for all-weather flying.

For example, we've hunted all over the country for certain icing conditions in which to test planes like the F-94, the P2V Neptune, and even the Constitution. The Beechcraft C50's instrumentation makes the airplane ideally suited for this work. Our pilots are competent, but we still want the safety factors that the modern C50 possesses. After all, this is 1956, not 1925.

But no matter what the mission, it's a whale of a lot of pleasure to fly the Twin-Bonanza. I only wish my little single-engine Bonanza would grow up into one. ★ ★ ★

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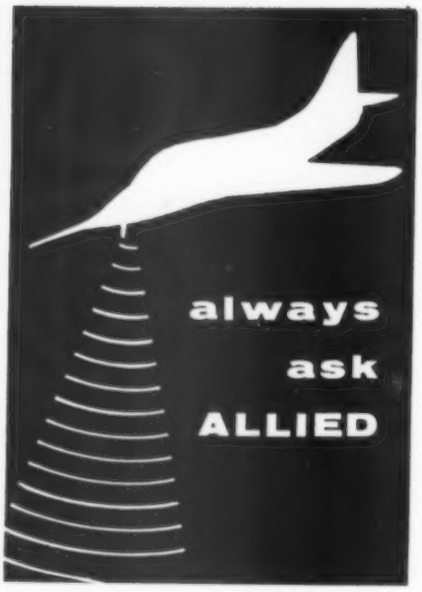

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Questions and Answers for Airport Operators

What To Do for Those Who Wait

QUESTION: In the ten years I've been an airport manager there has been one failure that has stood out above the rest in the handling of people in our terminal. Frankly I can't figure an answer. In fact it is reasonably hard to describe it. When a man spends his days working on an airport, he is busy and grows accustomed to the movement of passengers in and out, to the sight of passengers wandering around while waiting or sitting in the waiting room reading or talking to their neighbors.

Only in the evening and the night hours does this particular failure show itself clearly. Passengers are a restless lot for the most part, but it seems to me a major portion of that restlessness is due to having nothing to do but wait. In these winter months it seems there are more weather delays that create conditions under which passengers must kill time and in those same periods we have townsfolk who are waiting for incoming passengers with the same problem.

To be sure we have the coffee shop and the newsstand; we have the departure and arrival boards to watch. But how much coffee can a passenger drink and how exciting can an arrival and departure board be? Reading gets tiresome, too. I don't worry about traveling men so long as we keep a reasonably pretty girl at the newsstand counter. The people we seem to fail are those solitary older women who wait and the older couples who grew tired of talking to each other years ago. They sit or walk about restlessly, go in and have coffee, come out and wander some more.

At night an air terminal seems to lose its personality and to become a cold and lonely place. Other people, that is, those not traveling, are home doing whatever they like to do or are visiting friends, but the waiting passenger or visitor is simply a person with time on his hands and no place to go until his plane comes in.

Do you feel the same way about it? What are others doing about it?

ANSWER: One night last week we were in Amarillo waiting for a delayed flight. The delay was two hours although it started out to be much shorter. We called a cousin who lives in Amarillo and discussed the relative health of our respective families. Then we had a cup of coffee in the coffee

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shop with a traveling companion. We made that last as long as possible before going out to look at the board and discover that departure time had been postponed a little longer.

There were groups of younger people who seemed to know each other talking and seeming relaxed in the comfortable atmosphere of the waiting room. They made us seem all the lonelier. We finally sat down. A woman sat in the next chair, a woman of fifty-five or so. She seemed perfectly content to wait. In fact, when we finally boarded our plane she still sat in the same seat. But the restlessness you speak of in your letter assailed us and we got up for another look at the bulletin board. The departure time posted there turned out to be the time finally departed. We noticed a glass door off the waiting room with the legend "Video Lounge". We remembered having seen the same door on previous trips to Amarillo and pushed the door open.

Inside we found a dozen or so people sitting in comfortable chairs watching a television set, a console of good quality. We saw a program we never have watched at home. It was quiet and relaxing. Time passed quickly.

Several years ago we had occasion to wait a while in the terminal section at Tucson. There we found time easy to kill by wandering along the wall looking at the large photos of points of historic interest in and around Tucson. It was good advertising for it made us want to come back to Tucson to see the real thing. At Cleveland Hopkins Airport in Cleveland this spring we killed time looking over a new car on display in the waiting room. Amon Carter Field, Fort Worth, had a 1957 model of a popular car in the waiting room this week. It attracted a great deal of attention.

The display cases in the Waterloo, Iowa, terminal always give people something to look at when they have time to spare. The very structure and design of the new St. Louis terminal give people something to look at and wonder about until they have grown used to it.

We haven't been to Tulsa for some time. We wonder if the pictures Charles Short put on the walls are still there. They were worth a lot of waiting time. People who are alone like to have something to look at. Sometimes sound becomes annoying at the end of a busy day.

Comfort, however, has a universal appeal and comfort to a waiting passenger is an easy chair in which he can relax without crowding others. People sitting straight-backed in even rows are depressing even to themselves.

There comes a time during the night, too, when the waiting passenger needs more than a simple chair. Any seating structure that permits a man or a woman, for that matter, to stretch out and grab a cat-nap is welcome. We have slept in many a terminal waiting room and feel that we are a sort of authority on the subject of sleeping in an uncomfortably cramped position.

Perhaps the most restless sight of a night is to be found in the person of those who are caught traveling on Christmas Eve. We've seen this several times. Terminal employes seem reduced to a minimum, and anxious to be gone. Christmas music on the PA system seems like a mockery. A remembered Christmas season included a small spinet piano in a terminal lobby. It is surprising how many people in any given group can and will play the piano. Outstanding in the memory of that Christmas is the night that one of the most famous pianists in this country came through that terminal and graciously sat at the keyboard for better than thirty minutes playing a thousand dollars worth of piano for free.

If airport managers will tell us, we'll report what others are doing.

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